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## A Civil Service for the polys

Polytechnic administrators, it can be argued, do a more difficult job than their university colleagues. Yet they cannot be denied, receive inferior pay and status. Universities have always possessed a civil service of administrators, while the polytechnics have only recently emerged from the shadows of a tradition in which the principal, aided by two or three senior colleagues and a handful of clerks, was responsible for the administration of the college with the town hall looming bigly in the background.

The greater difficulty of the job of polytechnic administrators has two aspects. First, polytechnics are often more complex institutions than universities. There may be less research to administer, but polytechnic research (and consultancy) has a bewildering variety of types and sources that may make up for its still comparatively small scale. Polytechnic students are certainly more varied than those in universities and so represent a heavier administrative load. More are on sandwich courses or are studying part-time. More are on other than standard degree courses or are mature students, and there is an almost bewildering collection of short courses.

The second aspect arises from the fact that polytechnics lack the autonomy enjoyed (increasingly precariously) by universities. Financial

administration is constrained by their lack of corporate independence which means that no polytechnic, with the exception of the five inner London polytechnics, even has its own bank account. Academic administration is constrained by a consumed might occasionally be a better word – by the demands of validating bodies like the Council for National Academic Awards. The price of both this desirable diversity and perhaps necessary accountability has to be paid by polytechnic administrators. It is a price worth paying but it should not be underestimated.

The trouble is that it is underestimated. Administrators in polytechnics, tied to town hall salary scales, are paid much less than their university colleagues or their polytechnic academic colleagues. Their number is often inadequate for the important jobs they have to do. The great inequality of the salary policy does not consist in the two halves of higher education, which except at senior levels tend to be surprisingly similar, but in those of non-teaching staff including administrators.

But it is wrong to leave the impression that the town hall is entirely to blame. Some polytechnics have generously staffed directorates of administrative academics and hard pressed administrators. This balance is probably wrong for a number of reasons. First, it may be a misuse of

scarce administrative resources (too many generals, too few men). Second it tends to perpetuate the tradition of over-personal leadership in further education.

Third, it may depress the status and influence of professional administrators. They are kept in a subordinate or firmly technical role because the existence of powerful directorates prevents their gaining the necessary legitimacy on broader policy issues. This is a problem too in universities but not to the same extent. Yet if institutions, universities and polytechnics, are to retain their integrity and their effectiveness, they badly need to foster Civil Service-style administrators staffed by generic administrators who are not regarded as second-class members of the academic community.

However it is wrong to be too gloomy. Trusting in the effective formula developed by the Conference of University Administrators, the Association of Polytechnic Administrators has been very successful in its attempt to raise the self-consciousness and self-confidence of its members (although a move away from polytechnic exclusivity to take in the Humberides and Ealing would be very welcome). But it remains important to emphasize that the barriers to be overcome are not just bad pay and town hall apron strings but also the instinctive and unequal relationship between academics and administrators.

## A whiff of Keynes

The Department of Education and Science has won a quiet Whitehall triumph with its success in persuading the Treasury that half the cost of the extra students enrolled by polytechnics should be met by the government. The Treasury's expenditure plans should be offset against the social security payments that would have been made to these students had they remained unemployed.

The immediate advantage to DES ministers is that they can afford to take a much more relaxed view of over-recruitment in the non-university sector – in sharp contrast to the hard line that the University Grants Committee has felt it had to adopt to universities which appeared to be overshooting their 1984-85 student targets. Now the DES can adopt a liberal attitude to student recruitment in the safe knowledge that the Treasury will pick up half of any bill.

So the age participation rate can be kept up and sensitive parents and students do not need to be disappointed. It is difficult to dissent from a policy that, by however unsatisfactory a route, leads to a modest extension of opportunities for higher education. But perhaps two grumbles can be allowed. First, as with the "new blood" appointments in the universities, the Government can hardly expect to be praised for making

gains amelioration of a "problem" (academic atrophy in the case of "new blood" or demand) that is largely of its own making. Secondly, polytechnics and colleges are naturally suspicious of a policy the effect of which is to drive their unit costs still lower. It can be argued that lower unit costs are the price that must be paid for any successful extension of the range of higher education. In broad terms this is correct. But it remains an ominous fact that precisely the opposite policy is being followed by the UGC for the universities. This opens up the dark suspicion that the polytechnics and colleges are being used as a "dustbin" sector of higher education for reasons that have more to do with political advantage than educational conviction.

The DES line is to dismiss this argument as unreasonable and even paranoid. It is argued that there is plenty of spare capacity in the non-university sector, and that more students can be enrolled without loss of quality. Of course, under-used capacity exists and there is never a direct correlation between generous resources and higher standards. But the complacent optimism of the DES on polytechnic and college unit costs is being put under a microscope. It is an economy at its best, but here we are back to Keynes, and to political expediency. It is the place to stop.

## Update or else!

In this light, Dr George Tolley's suggestion that professional status should depend on a willingness to find time for continuing education has several attractions. Indeed, does Gratitude on receipt of the digital gold watch will be mingled with regret that the fifth generation – promised by the Japanese – is still so many years away. And while the latest computers turn into mutant pests faster than new techniques and practices, it is becoming no less a burden for professionals in other disciplines. It is not easy to concentrate on reaping the rewards of those long years of training, at the expense of keeping knowledge and skills up to date.

courses, and this model might well be extended to cater for the courses Dr Tolley's Open Tech will one day offer for updating technical skills.

The problems of carrying through the programme are considerable, but not insurmountable. The fastest moving fields are often as now that they have never paused to found professional institutions. But in these fields the market usually ensures that those who fall behind lose revenue. Then again some professions, such as the engineers, have all too many institutions – but continuing education will be well up the agenda of the Engineering Council from now on, so a unified for all professions is not too far off.

## Laurie Taylor



("US professor had 34 academic aliases" – *THES*, April 8).

Ah Dr Droggett. Thanks so much for popping in. I just wanted to have a quiet word with you about a little matter that's cropped up. Only too pleased Professor Lapping. Nothing serious I hope. No, not really, Droggett. Shouldn't take a moment.

Jolly good. Now I'm certain there's a perfectly satisfactory explanation, Droggett, but I have to tell you that we've had a rather tricky letter this week from a prominent civic university in the north of England.

Sir? And... well... quite frankly, Droggett, they've written to say that they believe that you may be working for them.

What's that sir? They believe – and I must say that the large colour snap they enclose with their letter does land some credibility to their argument – that you are a part-time lecturer employed by them under the name of Professor Linklater.

Linklater? That's right, Droggett. Do you deny this charge?

Not exactly sir, no. But it is, as you say, only a part-time post and one which I find perfectly compatible with my other commitments. Your other commitments at this university?

Yes. Those commitments... and a very small amount of other external part-time work.

For example? Well, since you press me sir, I must admit that I'm lucky enough to be Professor Lionel Bonington of Leicester University.

Oriental studies? Exactly sir.

Anything else Droggett?

Dr Kurt Lobenstein. Sheffield? Computer science?

Yes sir. It's more or less a straight run up the M1 from Leicester. That's the lot?

Yes indeed. Apart that is, from a minor administrative role which is of a slightly delicate nature.

I think you can rely on my professional discretion in such matters, Droggett.

Well sir, and you'll understand why I'd prefer this to remain strictly between ourselves, I am also proud to be the present vice-chancellor of Good heavens. Now I see the resemblance. It's just the moustache.

Exactly sir. So you'll appreciate the need...

Quite so. Do you wish to take this whole business any further Professor Lapping?

No, not really. Droggett. I must admit there are no complaints about your work in this department. It seems well up to the standard which is required of a senior lecturer.

Thank you sir. So I may go? No so quickly Droggett. I don't think this matter can be completely swept under the carpet. In fact, in view of your special abilities in this direction, I wish to impose a minor but appropriate sanction.

Sir? Briefly Droggett. I wonder if you mind attending faculty board next week for the rest of this term.

As punishment, sir? No, Droggett. As me, As me.

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## More students in 1990, says DES forecast

by Peter Scott

The Department of Education and Science now expects that higher education will enrol considerably more students over the next ten years than when it last made a formal projection of future student demand in 1979.

A revised projection published this week shows that despite the cuts imposed by the present government there are still expected to be more students in universities, polytechnics and colleges in 1990 than was anticipated in the last year of Labour rule.

The new figures reveal that the DES now predicts that:

- There will be between 13,000 and 26,000 more students in 1985/86 than expected in 1979.

- There will still be more students at the end of the decade than there are today despite a 10 per cent fall in the 18-year-old age group.

- The number of students in 1994/95, the bottom of the demographic trough, will only be 14 per cent less than today's total of 554,000. This fall is less than half that in the size of the 18-year-olds age group.

- The age participation rate will rise steadily from the present figure of 13.5 per cent up to and into the 1990s to reach a new peak of 15.9 per cent according to the most optimistic projection or 14.9 per cent according to the most pessimistic.

This DES report is the first stage in fulfilling the promise made in the February White Paper on public expenditure that "provision for higher education beyond 1985/86 when the

age groups will be falling is to be reviewed." It is significant therefore that the projection shows that this fall will have little effect on student numbers for several years after that date.

However, although the DES now admits that demand for higher education is likely to be more buoyant, it also warns that "if the number of places currently available were to be maintained, the supply of places would, sooner or later, exceed demand."

The new projection is likely to be criticized by some as still too pessimistic. The DES has based its figures on the assumption that the number of overseas students will stick at the present total of 46,000, despite the recent Government U-turn, and that the proportion of mature to young entrants will remain the same.

But the department does assume that there will be some increase in demand for higher education among qualified young people because of high unemployment. The paper points out that the qualified participation rate, the proportion of those qualified who get places, has increased from 85 to 88 per cent since 1979 and is now nudging the record figures of the late 1960s, and that during the same period unemployment has gone up from 1.5 million to more than 3 million.

However the DES believes that unemployment has the opposite effect on mature students. "Current evidence suggests that unemployment would prefer to retain their existing employment rather than risk unemployment following a spell of full-time higher education."

These new DES figures cover full-time and sandwich students only. No estimates have been made of the future demand for part-time courses and more generally for continuing education.

The last long-range projections of student demand were made by the DES in early 1979 in the paper *Future Trends in Higher Education* which was published for a conference organized jointly by the department and the *THES* and which updated figures given in the 1978 discussion document *Higher Education Into the 1990s*.

*Future Demand for higher education in Great Britain: DES Report on Education Number 99*, available free from the Publications Despatch Centre DES, Government Buildings, Horsepool Lane, Stanmore, Middlesex HA7 1AZ.

Leader, back page



The Open University was treated to its own preview of the film *Educating Rita*, which has its premiere next week in London. The star, Julie Walters, who plays an OU student, is seen with Mr Jo Clench, the university secretary.

## Tories pledge to protect Oxbridge entry system

by Paul Flather and David Jobbins

The Conservative Party has warned its political opponents it will fight any attempt to interfere with Oxford University's autonomy if they demand positive discrimination in favour of entrants from state schools.

In the party's evidence to the Dover committee, which is examining Oxford's admissions procedures, Mr Cecil Parkinson, the party chairman, said it would support efforts by the university to attract the most able students from state schools.

"However we are opposed to any form of positive discrimination in favour of maintained schools. If any political party sought to interfere with Oxford's freedom to choose its own candidates or insist on positive discrimination we would do our utmost to protect the autonomy of the university."

Embarrassed Conservative Central Office officials were forced to withdraw a press notice accompanying Mr Parkinson's evidence which wrongly alleged that the Labour Party, which has already made its submission to

Dover, advocated positive discrimination.

Labour called in its evidence for the abolition of the seventh-term special entrance examination, more offers to schools which could not give special coaching based on an interview and two A level passes, and more experiments/schemes to draw in the able from different backgrounds.

The party said it was not intent on a war of attrition against Oxford and did not seek quotas. But it did want a substantial shift away from private school entrants, and saw reforms as long overdue.

Labour saw a target of 70 per cent state school entrants by 1990 as reasonable and attainable. Currently just under half are from state schools, well below the average for other universities.

Elsewhere in the Conservative Party evidence, Mr Parkinson says that nothing should be done to detract from the university's efforts to pursue academic excellence.

College admissions procedures should select candidates who can both

## Lecturers discuss 4½% offer

by Ngalo Croquer and David Jobbins

University lecturers' union leaders today discuss whether to accept a 4.5 per cent pay offer which also offers the possibility of improved promotion prospects for many staff.

The package deal has been discussed by union and employers' negotiators and been rejected by the union side in the hope of winning further concessions at further talks yesterday.

Leaders of the Association of University Teachers accept that the vice chancellors have gone as far – if not further – than they can afford under the 2 per cent cash limit regime but were hoping for further progress on key structural parts of the package.

These are: special treatment for young lecturers by raising the age point from 26 to 27, payable on the fourth point of the scale rather than the third; deletion of the first point of all scales and joint pressure on ministers at Secretary of State level to increase the proportion of senior lecturers in each university.

Meanwhile, polytechnic and college lecturers' pay talks remained deadlocked this week. After nine hours of informal talks, the local authority employers remained adamant that claims for structural improvements including automatic progression from the Lecturer 1 to Lecturer 2 grade should be left to a review of the salary structure.

Schoolteachers have accepted 4.98 per cent – and a similar offer is waiting for lecturers if they drop their structural claims. But union leaders regard these as an integral part of a package which cannot be negotiated separately. They are expected to review the position before the next meeting of the Burnham further education committee fixed for next Friday.

The initial offer to university staff was 3.5 per cent – later upped to 4.25 per cent. Under further pressure, Professor Maurice Shock, chairman of the University Authorities Panel, increased the offer to 4.5 per cent on the understanding that it would be formalised if the AUT indicated it would accept it.

Although it was rejected at that stage by union negotiators, the offer remains in the wings pending the outcome of today's discussions. Even then Professor Shock admitted there will be some difficulties in selling the package to his fellow vice chancellors.

Facing her first round of negotiations as AUT general secretary, Ms Diana Warwick recommended rejection of the offer, arguing that more money was unlikely, but holding out for an improved package.

continued on page 2

## Wanted: a drop of Scotch new blood

Glasgow University, obviously encouraged by ten new blood posts from the University Grants Committee, is seeking even more new blood. The incentive is "the equivalent of six weeks' pay" provided by the department of medical science and science which is seeking to replace alcohol metabolism which requires frequent samples of breath, and a few of blood.

An advertisement for volunteers to the university's *News Letter* adds, "The whole process is highly paid and the employment of the staff is not discouraged."

## University walls have too many ears, warn venturers

by Jon Turney  
Science Correspondent

Universities anxious to attract venture capital investments in new technology should stop their ideas being leaked, say the managers of the leading British venture fund.

Dr John Walker, manager of biotechnology investments for Technical Development Capital, told a meeting of university industrial liaison officers in Birmingham this week that British universities were notorious for

leaking intellectual property to outside entrepreneurs without any formal arrangement.

It was not unknown for foreign concerns to set up a small company next to a university campus just for the information they gleaned from casual exchanges with academic visitors or consultants, he claimed.

Dr Walker and Mr Geoff Taylor, TDC's director, said that they would like to do more business with universities to add in the four companies they had already set up. But the lack of clear

decision-making in some universities could be a significant deterrent.

As "active" investors, TDC were looking for highly motivated management teams, offering new products with prospects of fast growth in a market worth at least £1m. Marketing and financial expertise were more important than technical flair.

The key to successful collaboration was motivation on the part of the academics involved and the university administration, preferably at the highest level. Universities were notorious

for inflexible structures, inability to set and meet targets and for getting decisions made unless the vice chancellor takes a personal interest.

If all these conditions were met, the outlook was good. "There's more technology than I can handle personally in British universities – the problem is getting it out in a form which makes commercial sense," said Dr Walker.

The University Directors of Industrial Liaison are also trying to get a less capital-intensive technology out of universities.



## Youth scheme threatened, say councils

by Patricia Santinelli

Lack of funds for colleges from the Manpower Services Commission and lack of information about the number of places it will offer under the Youth Training Scheme is threatening its future and quality, according to the Association of County Councils and the Association of Metropolitan Authorities.

The ACC is seeking a meeting in May with ministers at the Department of Employment and the Department of Education and Science to find a solution. If nothing is resolved it will once more approach the Department of the Environment about exemption from penalties bound to be incurred as a result of funding the YTS.

In papers forwarded to the House of Commons Select Committee on Education, Science and the Arts, both associations say that the £50,000 capital grant is far too little, and will still be inadequate when it is raised to

£100,000. This is a new unofficial level negotiated with the MSC.

The ACC believes that this should be raised to at least £150,000, while the AMA has suggested £250,000. However the Treasury has turned down this amount.

The associations are worried because inadequate funding has prevented colleges from acquiring additional buildings or classrooms. Because funds can only be spent on buildings, not equipment, colleges fear that they will not be able to provide adequate training, for example in new technology.

In addition, the fixed amount per college is penalizing the larger colleges which were created in the interests of efficiency and cost-effectiveness. According to the associations, local authorities are attempting to rectify underfunding out of their own budgets but are both worried and reluctant because of the penalties they may incur.

The associations also argue that the planning of courses and quality of training is being jeopardized by the MSC's insistence on an employer-led scheme and the use of local authorities as last resort. This has meant that authorities have not yet been told the number of places their colleges should offer under YTS Mode B courses.

These are schemes sponsored by voluntary agencies or local authorities. In its paper the ACC cites Gwent authority, as typical of the conditions others face. The Gwent MSC area manager is so convinced that he will find 3,000 Mode A places sponsored by employers - a figure the authority says should be halved - that he refuses to allocate more than 350 Mode B courses to the area's colleges.

Gwent has not yet been told how many places it can expect to offer under Mode A courses. Under an agreement with the Confederation of British Industry, authorities are expected to provide 70 per cent of the

training under Mode A. A further worry is that MSC payment for Mode B courses has not yet been agreed.

The authority says it is in an awkward position where it is forced to assume a certain amount of expenditure and number of places on the basis of "guesses".

It has estimated that to run the YTS properly it will need to hire an extra 25 to 30 technicians and administrative staff, at an annual revenue cost of £500,000.

● The Government's advisory body on teacher training has urged the Supply and Education of Teachers that the separate growth of staff development for the YTS to halt growing confusion.

The Advisory Committee for the Supply and Education of Teachers says that the separate growth of staff development through MSC-accredited centres has left the education service confused about its role.

## Inquiry brought forward

by Felicity Jones

An investigation by Her Majesty's Inspectors into the applied social studies and sociology courses at the Polytechnic of North London - subjects of a complaint over alleged left-wing bias - has been brought forward.

These courses, along with a European studies course were scheduled within the HMI's three-year investigation of over 100 degree courses in the maintained sector. Before the complaint to the Council for National Academic Awards, was received, the diploma in social work had already been looked at but the investigation of the sociology and applied social studies degree courses has now been brought forward by six months or so.

The HMI's further study, however, originally was to do with concern over training social workers in parallel with the degree course. One defect of the course is that only half the students can get the required training place.

Dr David MacDowall, PNL's director, said that the inspector's visit was only partially coincidental but that the visit had been brought forward by six or nine months. He added that several other courses were also being studied, including the science and engineering and European studies degrees.

The polytechnic is awaiting an official letter from the CNA's chief officer Dr Edwin Kerr which will outline suggestions for resolving what is to be done over the complaint made by a former member of staff. Concerning Marxist bias in the courses, it went with an appendix to Lady Caroline Cox, the Conservative peer and previous head of the sociology department, to the CNA with a copy to Sir Keith Joseph, the education Secretary of State.

The polytechnic's management has always been assiduous in pointing out that the complaint was not made to PNL directly. The CNA's letter will go before the polytechnic's academic board in May and Dr MacDowall said that he might or might not be an inquiry as a result.

"The allegations against the applied social studies and sociology courses are complex and it will be up to the academic board to consider them formally," he said. Informal tripartite discussions have been held over the past few weeks between the polytechnic, the Department of Education and Science and the CNA.

## Poly denied research cash

The Engineering Council and the Science and Engineering Research Council have rejected requests to fund research at Leicester Polytechnic aimed at solving problems of engineering education.

The Leicester team believes this was because the council fear that its work would raise too many awkward issues, especially for the Engineering Council.

Mr Geoff Beuret, the director of the proposed study, said this week: "One would expect a research programme like ours to expose difficulties and problems of engineering education, and some people may be reluctant to have these exposed; established they are in education institutions, in engineering education."

The Leicester researchers were surprised by the decision because the Council for National Academic Awards has already promised £50,000 to cover half the cost of a follow-up to their recent report on engineering education. They were only seeking £12,500 each from the SERC and the Engineering Council.

One engineering company has already refused to provide funds for the study as a result of the SERC decision, although other possible backers may still come up with the extra £30,000.

The SERC's rejection letter argued that the situation in engineering education was too fluid to justify a £100,000 study while the Engineering Council says it wants to concentrate its limited resources on research which is yet to be defined.

## Programme for computers

by Jon Turney  
Science Correspondent

Funding for university computers should be switched to provide more teaching and less research, a national working party has decided. Its report will be considered soon by the Universities' Computer Board.

The board, which is funded directly by the Department of Education and Science, spends £30m a year on university central computing facilities, including the two large university regional computing centres in London and Manchester.

At the moment, only around 10 per cent of this sum goes on equipment used for teaching, with the remainder contributing to research. Other uni-

versity computers, for administration and research in individual departments are paid for by the University Grants Committee or the appropriate research council.

The working party now finalizing its report is chaired by Dorothy Nelson of Hatfield Polytechnic. It was set up because some board members were concerned at the proportion of their total allocation spent on research machines when there are other sources of funding for the main beneficiaries of this part of the budget.

The group is exploring the needs of university teachers in disciplines outside science and engineering for access to computers, in the belief that they could make greater use of computing power.

There are problems with such a study because some machines have multiple uses, and some universities are unable to specify exactly what all their computers are used for. In addition, computer time used by research students is hard to fit into a simple teaching/research classification. But the results of approaches to every university have confirmed that research takes the major part of the board's money.

The group is now almost certain to propose a shift in this balance in favour of teaching when its report goes before the board next month. It may also argue for more money overall, hoping to the advantage of the DES's current enthusiasm for information technology.

## Benenden stoops to conquer

by Felicity Jones

Benenden - the school Princess Anne went to - held an open day to present the higher education opportunities available to pupils at polytechnics for the first time at the weekend.

Parents and sixth formers at the girls' public school in Kent heard representatives from Leicester, Portsmouth, Middlesex, Bristol, Brighton, Hatfield, Kingston, South Bank, Thames and City of London polytechnics and three colleges of higher education.

Miss Janet Allen, the school's headmistress, said afterwards she thought both parents and pupils had been impressed by the variety of courses available at the polytechnics and particular interest was shown in the modern languages with international studies and European business administration courses which were available.

"We have sent girls to polytechnics over the years but we feel that the girls needed more assistance with the opportunities available. There is particular interest in those courses with a practical leaning," she said.

A spokesman for Leicester Polytechnic said he thought this demonstrated the double stereotype that girls do not do technical things and do not go to technical colleges. He thought the quality of the courses was now overriding any preconceptions about polytechnics as institutions to which you did not send your daughter.

Mr Julian Ayer, head of the careers, placement and liaison service at Middlesex Polytechnic said: "The fact that one of the top girls' schools is showing interest in the polytechnics shows the value of the courses and the realization that it is not just the few high-flyers amongst girls who go to Oxford or Cambridge who want higher education." He thought the more practical, less academic content of the polytechnic courses was an additional attraction.

It was those practical courses in hotel and catering management and European business studies which were not offered in universities which prompted the most interest at the open day.

One of the reasons why girls' public schools are taking more interest in the careers and education prospects of pupils is the competition posed by the boys' schools which are recruiting girls to their sixth forms. This is forcing girls' schools to take an active part in career advice so as to make themselves more competitive.

## Sapper soft-pedals into retirement

Mr Laurie Sapper, for the past 14 years general secretary of the Association of University Teachers, retires today. But the piano lessons he promised himself will have to wait - he faces a busy schedule as a member of the Committee of Inquiry into the Ford (Halewood) dispute and other inquiries later in the summer.

He is being succeeded by Ms Diana Warwick, who takes over fully as secretary on Tuesday. Mr Sapper said: "I shall miss all the people I have worked with, but I don't think I shall miss the inevitable problems."



The present meets the past at Queen Mary College, London. Archaeologist Kevin Flude (left) demonstrates the use made of microprocessors at a recent dig in the City of London to Dr John Stratford, of the college's computer centre. The demonstration was part of a QMC open day on arts and computing held this week to show the wide range of computer-based facilities now available to arts lecturers, researchers and students. Among the other projects exhibited were the logging of a Burmese dictionary, two university typesetting systems and computer packages for teaching modern languages.

## Council reviews workload as pursestrings tighten

by Paul Flather

The national social work training council is preparing to review its range of activities because it is unable to keep within its budget.

The Central Council for Education and Training in Social Work is particularly worried about the increased workload caused by the 1982 Mental Health Act. It has only got a 4 per cent increase in its £2.2m budget to cover for 1983/84.

But it now appears that the council will avoid having to renege on any of its statutory duties, as it first feared. It sent a letter to ministers last winter warning that after two 10 per cent budget cuts in three years, it was reaching a point of no return.

Dr Harry Kay, chairman of the council, and vice-chancellor of Exeter University has welcomed some ministerial recognition of the council's difficulties. But he warned that priorities would have to be kept under review, given the cuts and inadequate allowances for inflation.

The council is now looking for savings in its national planning structure, including its five regional offices; its already reduced validation work which will mean longer intervals between course reviews; and its post and pre-qualification work. Details are expected shortly.

## Support the Open Tech, says Tolley

Colleges should play a much greater part in the Open Tech programme, according to Dr George Tolley, the head of the Manpower Services Commission Open Tech Unit.

Speaking at the Open Learning Federation's annual conference in London, Dr Tolley said that many colleges had already suggested projects but much more needed to be done.

"There are other needs still to be met such as maintaining part-time courses and updating courses for technicians which have barely been touched," he said.

Dr Tolley also urged colleges to consider how the Open Tech programme could help improve the quality of education and training.

## Protests mount over social science closure

by Olga Wojtas  
Scottish Correspondent

Opposition is mounting to the Scottish Office decision to axe social science at Paisley College of Technology and probably transfer its social studies courses to other colleges.

Staff involved are urging the Scottish Education Department to hold a public review of the courses' future, and the Political Science Association, the British Sociological Association and the Central Council for the Education and Training of Social Workers are all pressing the SED to reverse the decision.

The SED says a redeployment of resources within Paisley away from social science "will further enhance the college's reputation as a centre of technology responsive to modern industrial requirements."

But Professor John Foster, head of the politics and sociology department, claimed that Mr Alex Fletcher, Scottish Office minister for industry and education, was "flying in the face of all recent reports on what British industry needs". Studies such as the Finnieston report on engineering and the Alvey report on information technology showed a clear role for social science in future industrial development.

"This decision involves a serious

issue of principle in that it was taken without any review of a public character," said Professor Foster. "The policies which developed the present courses were sanctioned and approved by the SED over 15 years, and we do believe a public review is necessary."

The proposals were also denounced at the Scottish TUC conference in Rothesay last week. Mr Jack Dale, secretary of the Association of Lecturers in Scottish Central Institutions (ALSCI), told the congress that the proposals were "the latest lynchpin in Scottish higher education. The cuts show the deep hostility to social science in this Government, they are determined to prevent the spread of genuine social understanding."

The politics and sociology department is most at risk and Mr Fletcher has denied allegations of political prejudice against the department and Professor Foster, a leading Marxist intellectual and member of the Communist Party.

Mr Dale said: "Professor Foster conducts himself with the utmost decorum and is highly respected by his staff. Allegations of political bias are nonsense. It's a balanced course. We teach Karl Marx on some courses and right-wing economics on others."

## BRITISH GAS ENGINEERING RESEARCH AWARDS, 1983.

British Gas supports post-graduate research at Universities and Polytechnics through its long-established Research Scholarships, and through its Engineering Research Awards, established last year.

Three Engineering Research Awards will be made in 1983, to support postgraduate engineering research in Universities and Polytechnics in the United Kingdom.

Attractive financial aspects of the Award include: a maintenance allowance for the research student comparable to a fully "topped-up" Science and Engineering Research Council CASE Award (currently up to £4225 p.a. for a student living in London); a book allowance of up to £200; and an opportunity for the student to make one technical visit abroad. There is also an annual equipment allowance for the Department of £1100.

The topics from which this year's Awards will be chosen by British Gas are as follows:-

- 1) HEAT EXCHANGER DESIGN FOR HIGH EFFICIENCY GAS APPLIANCES.
- 2) NOVEL TECHNIQUES FOR METERING GAS FLOWS.
- 3) THE EFFECTS OF TURBULENCE STRUCTURE IN ULTRASONIC FLOW-METERING.
- 4) HEAT TRANSFER ENHANCEMENT IN TWO DIMENSIONAL LOW REYNOLDS NUMBER DEVELOPING FLOWS.
- 5) AIR ENTRAINMENT INTO COLD DENSE VAPOUR CLOUDS.
- 6) UNDERGROUND LOADING OF PIPES.

Specific proposals are invited from Heads of Engineering Departments of Universities and Polytechnics relating directly to one or more of the above topics. These proposals should be sent to the Manager, External Affairs, Research and Development Division, British Gas Corporation, 326 High Holborn, LONDON WC1V 7PT, from whom further information may be obtained. The closing date for applications is 31st May 1983.

BRITISH GAS

## Policy makers 'don't learn from the past'

by Jon Turney  
Science Correspondent

Science policy makers in Britain make little use of techniques for monitoring past performance when allocating funds for new work.

This conclusion, from a report by the Science Policy Research Unit at Sussex University, is based on interviews with senior officials of the major funding agencies and research directors in universities and research council laboratories.

However, the authors, John Irvine, Ben Martin and SPRU's director Geoffrey Oldham, also found that their interviewees felt a need for new initiatives to find ways of assessing research, to augment the present system operated by the Advisory Board for the Research Councils and the University Grants Committee. Their decision-making was described by one anonymous informant as based on "the informed prejudices of wise men" with little formal analysis.

The SPRU authors report that some of the policy-makers they approached were completely unfamiliar with international research statistics now compiled by agencies like the US National Science Foundation, and they suggest that "few had a full understanding of their possibilities for policy purposes".

The report is particularly critical of the UGC, which, it finds, took almost no account of research performance in

determining the distribution of the university spending cuts in 1981/82. Ironically, the report, one of a succession of comments from SPRU on science policy evaluation, was commissioned by the French Ministry for Research and Industry.

In this country, by contrast, there has been little enthusiasm so far for work of this kind. Martin and Irvine have argued that citation analysis and extensive interviewing across a scientific speciality can yield reliable information on the relative performance of large establishments. Their own latest paper, published last week, found for example that the Science and Engineering Research Council's election synchronisation (NINA) was expensively unproductive.

The new report seems to indicate that British policy-makers are more receptive to this work. But the interviewees in this study were almost all administrators and civil servants - in the UGC, ABRC, Department of Education and Science and the research councils - rather than scientists. So this may simply indicate that the professional managers are unhappy with a peer-review system heavily dependent on expertise held only by scientists.

Research Evaluation in British Science: A SPRU Review, Science Policy Research Unit, University of Sussex.

Big ideas for big projects, page 12

## Tory pledge to Oxbridge

continued from front page

contribute to and profit from the life of the university, and who are suited by natural aptitude and previous training to academic study at the highest level.

"In the past such criteria were not always applied. Unsuitable candidates sometimes succeeded for reasons irrelevant to the proper purposes of a great university," Mr Parkinson said.

Conservatives and all those who cared for the continued intellectual prosperity of Oxford must wish to ensure that such weaknesses were eradicated, he added. "We are aware that at present many candidates from maintained schools are woefully deterred."

The 14-member committee under Sir Kenneth Baker, president of Corpus Christi College, Oxford, has almost completed its deliberations and a consultation document is expected at the end of May. "Evidence is still coming in, but it is unlikely anyone will now come up with anything totally new," Sir Kenneth said this week. No evidence has come from the Liberal/Social Democratic Alliance.

In there class bias, page 13

## College reprieve?

Officials from the Department of Education and Science have told De La Salle College in Manchester, which is threatened with closure, that it may reconsider its decision after the case has been heard in open court towards the end of June.

## Prisons need more local help, say MPs

Local education authorities should increase the level of support given to prison education departments and all prisoners should have the right of access to education, according to a House of Commons Select Committee report published this week.

The report from the Select Committee on Education, Science and the Arts calls for a new Prison Regimes Act to embody the educational rights of prisoners.

"Education is the final objective of the regime and needs to be promoted forcefully at all levels," the committee says.

Prison Education, first report, House of Commons paper 45-1, price £6.50 from HMSO.

## Overseas support 'merely psychological'

The Government's £46m package of support for overseas students was dismissed this week by the author of the report which inspired it to be largely psychological, rather than practical value.

Professor Peter Williams, whose report for the Overseas Student Trust led to the Government's initiative, told backbench MPs he welcomed the package, even though it fell short of his recommendations. But he added: "This decision represents a psychological turning point rather than anything else."

The fall in the value of the pound has been far more helpful for the majority of overseas students, who were still



Four prize-winning students at West-Bromwich College of Technology have won top awards from the London Academy of Music and Dramatic Art. Numbers on the college's speech and drama courses are booming despite high unemployment in the region, as some students seek interview skills. The four prizewinners pictured (left to right) are teacher Anita Rybinski, factory worker Ryan Mejlis, teacher Hazel Wall, and Robert Hopkins, an unemployed former storekeeper.

## Croydon staff dismissed in bid for longer teaching hours

Dismissal notices are being sent to all 287 teaching staff at Croydon College in an effort to enforce the local education authority's aim of longer class contact hours.

The lecturers are being given three months' notice from May 31 - but offered new contracts which contain the changes in conditions of service which the local authority first demanded last year.

This week, Croydon's education committee voted first to increase all lecturers' class contact by two hours to the maximum permitted by a national agreement and secondly to abolish a practice under which teachers may spend half the difference between their teaching hours and notional maximum 30-hour week away from the college.

The National Association of Teachers in Further and Higher Education at the college has told its members not to sign new contracts and has withdrawn a concession under which staff were prepared to work more than their class contact time when invigilating examinations.

Meanwhile, the Advisory, Conciliation and Arbitration Service is arranging talks between Matthe, Brent, and the Metropolitan Police in an effort to solve the dispute which began when Mr John Perchard, a lecturer at the school, was barred for releasing racist remarks to the media.

Branch secretary Mr Eric Nash rejected suggestions the union had been dragging its feet in negotiations. "We had to force the authority to the negotiating table in November and it has been recalcitrant in negotiations since then."

Mr Donald Nalsmith, Croydon's director of education, said: "We are available for further negotiations at any time."

Lecturers employed by the Labour-controlled Brent education authority have halted preparation for Youth Training Scheme courses due to be introduced in September in protest at the decision to withdraw 28 civilian staff from Hendon police cadet training school.

The Leicester team believes this was because the council fear that its work would raise too many awkward issues, especially for the Engineering Council.

Mr Geoff Beuret, the director of the proposed study, said this week: "One would expect a research programme like ours to expose difficulties and problems of engineering education, and some people may be reluctant to have these exposed; established they are in education institutions, in engineering education."

The United Kingdom Council for Overseas Student Affairs, by giving evidence at the same session, called for a similar panel to be established to advise the Government on fees. A meeting had already taken place with the junior ministers.

● A Bill was introduced last week by Sir Keith Joseph, Secretary of State for Education and Science, to restore the previous definition of an overseas student for the purposes of tuition fees.







# University agrees to copyright guidelines

from E. Patrick McQuaid  
CAMBRIDGE, Mass.

A massive lawsuit charging one of the nation's largest private universities with copyright infringement has been settled out of court with the university agreeing to curb future abuse among its teaching staff.

The action, brought in December by the Association of American Publishers on behalf of nine major publishing houses, sought an undisclosed award for damages and a permanent injunction against the New York University and nine individual professors who had allegedly photocopied and distributed course materials without the permission of the copyright holders. Also named as a defendant in the original suit was the Unique Copy Centre, a shop near the university's campus in Washington Square, Manhattan.

In exchange for dropping the suit, the university has approved internal guidelines concerning the duplication of copyrighted materials and for policing compliance among the staff. Action

against individual teachers, one of whom died recently, has also been dropped but negotiations between the publishers and the local copying shop continue, with court proceedings likely.

As part of the settlement New York University is agreeing to publish the new policy in the staff handbook and to investigate any cases of alleged abuse - reporting them to the publishers - promptly. The administration further agrees to "take appropriate action" against staff who are found guilty of copyright infringement. While such measures are left to the university they are to be "consistent with remedial or disciplinary actions" carried out when other university policies are violated.

Both parties have agreed to cover their own expenses stemming from the suit and the settlement. No figures were made public.

The publishers say they are content with the settlement, noting that they were not especially interested in taking their case to trial. The point of their action was to set a precedent, sending a message to other American colleges

and universities where duplication of material is widespread. It is expected that many institutions will adopt similar guidelines. Yale and Johns Hopkins universities had voluntarily adopted such provisions.

The guidelines at New York concern multiple copies based on the length of the excerpts being used. The emphasis is on brevity. Teachers need not seek permission to copy 10 per cent or less of a prose work or 250 words of poetry, for example. The policy does not concern individual students who make copies for their own use.

A similar settlement was reached between the publishers' group and a chain of photocopying stores, the Gnomon Corporation of Cambridge, Massachusetts, which runs outlets near several campus locations throughout the northeast. Out of court settlements were also reached with a variety of private research firms where photocopying of scholarly material is prevalent.

Had the New York case gone to trial representatives from the country's

largest professors' union, the American Association of University Professors, and from the American Library Association say they would have sided with the university.

The publishers - Random House, Simon and Schuster, Houghton Mifflin, Addison-Wesley, Alfred A. Knopf, Basic Books, Little Brown, Macmillan, and the National Association of Social Workers - say they will continue to aggressively pursue copyright violators at other universities. Under the New York agreement, teachers seeking to duplicate lengthy copyrighted materials must seek the permission of the publishers and supply them with specific information on how many copies are to be made and how they are to be used in course work.

Should a professor be denied permission to duplicate materials, a request to do so must be forwarded to the university's general council. Staff not complying with these measures will not be defended by the university should the copyright owners seek punitive measures.

## Entrance exam put to test

by Sarah Jane Evans

As some 165,000 sixth-formers prepare to take the tests for university entrance in June a conference is being held at one of Madrid's universities to find ways of improving the current system of selection.

On the pattern of previous years, roughly 70 per cent of the candidates will probably pass the tests and will then be able to take up places at university this autumn. A few facilities now impose quotas on numbers, notably in medicine. Others suffer severe overcrowding, which led last autumn to angry demonstrations on the campus of Madrid's largest university.

But it is standards, not numbers which is at issue at the conference - funded by the Education Ministry and Madrid's Autonomous University. Lecturers argue that the current tests don't pick out the most appropriate candidates. This has the effect of reducing first-year university teaching to the dictation of notes to be learned by rote.

The sixth-formers are all students of a course known as COU (Curso de Orientación Universitaria). COU, like secondary education in general, has not yet undergone the reforms that have begun with primary education. Its formal style and content are blamed for the high drop-out rate (in the province of Catalonia, for instance, 35 per cent of secondary school students drop out before they get to COU). And those who do make it can find it difficult to adjust to the more independent study methods at university - which leads to a further substantial drop-out during the first year.

The selection debate goes back to 1938, and the Secondary Education Act. The state baccalaureate was then run by the universities, and had written and oral sections. In 1943 a further law enabled universities to set their own entrance examinations and the ministry to set quotas of students.

The pre-university sixth-form course was introduced with its own examination, which supplanted all the others in the 1950s. This exam was based on the work that had been studied in the year, but was still of a very traditional kind. In 1974, the current system of selection was introduced: the language test was abolished, and baccalaureate results were given equal weight with the university tests. The interesting point to note is that between 1970 and 1974 there were - because of changes in the law - no university selection tests. The proportion of students who went to university stayed almost constant, and there were no major complaints about student standards.

The Institute of Education at Madrid's Autonomous University has been working to identify the qualities students need at university (such as the ability to work alone, to compare and assess different texts, to be able to express themselves, etc.). They find that it is just those things which the university preparation course, COU, currently does not provide, because, they say, universities were not consulted when the curriculum was compiled.

The conference on selection faces the problem that there is little room for manoeuvre. While the law still stands, the universities cannot make many changes. But the arrival on the scene of a new government late last year, committed to substantial changes in the existing education system, gives lecturers and students the confidence to act on long-standing discontents.

One of the slogans of the adult education programme runs that "CPE takes you from where you are to where you want to go." Evelyn signed up immediately. "It is my first chance since I was 14 to learn about myself. I am not going to miss it," she said.

A specialist in international law at Bonn University, Mr Christian Tomuschat, said that nearly all West European countries tried to keep extremists out of public service. But only Germany applied the same yardstick to both the "under-secretary and the grave digger." Elsewhere, he said, the chief consideration was one of security, whereas West Germany demanded loyalty to the constitution.

people from joining such organizations as the peace movement.

The German system of excluding extremists from the public sector is based on an agreement between the *Laender*, or states, in the early 1970s. It is interpreted with varying degrees of strictness from region to region, depending on the political colour of the local government.

A specialist in international law at

## Government widens control

from Guy Neave

PARIS

Crucial changes in government control over higher education in France have been announced by M. Alain Savary, minister of education.

A new Superior Council for Higher Education will replace the temporary council last set up in August last year. It will have control over academic appointments and deal with the career aspects of university administration.

Three quarters of the council members will be elected from a multi-candidate list. The remainder will be co-opted.

Previous councils were hotly accused of being instruments for government and political favouritism under the previous regime but were limited to the university area alone.

The new body will cover both medical and dental fields - a notable departure from previous practice. It will also include tenured teachers from the elite *grandes écoles*, researchers and their assistants as well.

The inclusion of the *grandes écoles* is a new development. Hitherto this

elite sector of French higher education has remained untouched by the storm and strife - and the legislation - that affected the universities.

In announcing this step M. Savary has raised the delicate and touchy issue of how far the *grandes écoles* are to be brought within the overall responsibilities of higher education. The French Socialist Party's election manifesto called for their incorporation, but the higher education framework bill which is still in draft stage, seems to be fudging the issue.

The third round in the long drawn-out battle between government and lecturers unions on revised conditions of service has just begun.

The dispute reached a deadlock last November amidst mutual recrimination and it is becoming more acute as the unravelling of the higher education framework bill approaches. The Bill will make radical changes to undergraduate studies and introduce considerable changes to higher education's remit.

One of the main stumbling blocks is the revised number of hours lecturers will be expected to teach

each week. At present this averages three hours a week for a 25-week year in addition to tutorial work. M. Jean-Jacques Payen, director-general of higher education, has instead proposed four hours teaching per week over a 32-week year and six hours tutorial work spread over a 25-week year.

This work load is not unusual. It is current practice in the university institutes of technology - France's equivalent to the polytechnic.

Academics also have to face the question of their profession's future structure. At present it is divided into three parts: professors, *maîtres assistants* and assistants. Current ministry proposals envisage two grades - professor and *maître de conférences* (roughly equivalent to senior lecturers). Mid-range lecturers (*maîtres assistants*) will, if they wish, be on the senior lecturer grade.

Lecturers' unions are pressing for a single teaching body while the non-Communist Syndicat General de l'Education Nationale has called for equality between all university teachers.

## Colleges count the cost of the microcomputer wave

from Sally Reed

WASHINGTON

The microcomputer's impact on college campuses throughout the United States over the last few years has led to dramatic changes in both administration and teaching.

The new technology has also created a host of new problems for colleges and universities over financing, teacher training, the development software and philosophical issues about providing adequate access to all students and academic freedom.

Some 2,000 college presidents, deans and lecturers addressed these issues recently at a national conference on "Colleges enter the information society" sponsored by the American Association for Higher Education.

There is no longer any question that the technology has transformed higher education. Colleges now spend an estimated \$300m on computer courseware each year. Stanford University claims that 60 per cent of its lecturers now use a computer or word processor in their work. At the Rochester Institute of Technology all faculty and students - regardless of the field of study - are required to have some familiarity with the workings of a computer. At Carnegie-Mellon University, one of the leaders in computer use in education, all lecturers, administrators and 7,000 students will have their personal computers.

The problem for many educators is that while computers may be plentiful on some campuses, they are rarely used on others. John B. Slaughter, chancellor of the University of Maryland at College Park, stated that students educated with the computer were generally white, middle-class children. Unequal access to computers in the elementary and secondary schools reinforced the shortage of minorities in computer fields at the postgraduate level, he said.

Alfred Bork, professor of physics and computer science at the University of California at Irvine, said that in 20 years the computer would be the major source of information for students. "But the real problem is - where is all the course material going to come from?" he asked.

American universities did not have a tradition of developing courses and lecturers were unable to develop their own, he said.

A consulting service for computer software publishers surveyed 607 lecturers and discovered that academic deans spent an average \$1,061 per year on software and that the programs were most often used in mathematics and for word processing.

Loyola Marymount University now uses software programmes to teach business courses. A professor at the University of Chicago has a database of 150 million words of French texts spanning three centuries and available to other scholars nationwide. Music instructors at the University of Delaware use PLATO, a self-paced individualized instruction programme, to teach tonal and note recognition.

The problem for many educators is that while computers may be plentiful on some campuses, they are rarely used on others.

the "irrational" rationalization effected between 1970 and 1977.

A new faculty of veterinary medicine and animal sciences had been established; the dental school at Peradeniya had been expanded to form five departments of study; two former departments of Pol and Buddhist studies at Peradeniya and Sri Jayawardanapura which had been disbanded under "rationalization" were now restored.

It was however in the establishment of new institutions that a "remarkable" degree of progress had been shown, Dr Kalpage said. These developments had resulted in an expansion of university education both at the undergraduate and the postgraduate levels, Dr Kalpage continued. From an annual intake of around 3,500 to the traditional universities in 1976, admissions had increased to about 5,500 in 1982/83 with a total enrolment of 18,600 undergraduates and 2,050 graduate students. In addition, the Open University's current enrolment of 8,000 would expand to around 18,000 by the end of the year.

Dr Kalpage also noted the stimulus to the use of English.

to remove the frustrations caused by



Pope was visiting lecturer

## Pope seeks to extend Polish tour

by a Special Correspondent

Pope John Paul II wants a visit to the Catholic University of Lublin to be included in his Polish itinerary. Until his election in 1978 he was a visiting lecturer at Lublin and recently the university awarded him an honorary doctorate.

The itinerary for his Polish visit does not include a side trip to Lublin. But he is reported to have asked for at least a six-hour slot when he could receive the degree and make the appropriate address to the university.

The Catholic university of Lublin is the only higher educational institution in the entire Socialist bloc which is not run by the state. The Polish authorities have long considered it to be a focus of dissent and since the late 1970s its students have published the underground literary magazine *Spotkania*.

The rival institution, the Maria Sklodowska-Curie technical university of Lublin, set up by the state as a counter-influence, has also shown a strong tendency over the last few years to support the liberal trends embodied in the *Solidarity* movement.

No official announcement has yet been made about the Pope's wishes. The proposed itinerary, authorized by General Jaruzelski's government, ignores Lublin. But it is believed that the Pope has instructed the Vatican civil services to forward his wishes to Cardinal Glemp in Poland who will presumably submit them to the government.

During the last few days a delegation from the Catholic university of Lublin, headed by the rector, Dr Mieczyslaw Krapiec, has been visiting Britain.

In a lecture given at the Polish social and cultural centre in West London last week, Dr Krapiec stressed the importance of his university's survival as the only academic institution in Eastern Europe aimed at educating the whole human being.

## New Asian centre will cross-fertilize ideas

by Thomas Land

A new United Nations centre will coordinate agricultural research at dozens of Asian universities in an attempt to improve living standards for the vast majority of farmers bypassed by the "green revolution".

The Regional Coordinating Centre for Research and Development has just opened in Bogor, Indonesia. It will act as a clearing house for agricultural innovation in a geographic area covering almost half the surface of the earth and containing more than half its population.

The centre has scientific, technical and financial backing from nearby Australia and several other countries and is primarily concerned with coarse grains, pulses, roots and tubers.

In the low-income countries of the region, these crops are among the essential components of the staple diet of most people. In the high-income ones they serve as a major source of animal feed as well as raw materials for industrial use.

Rising world demand for these commodities has turned the region into a net importer, driving up prices and causing scarcity and hunger. The new centre is part of a long-term project to increase supplies substantially.

Housed in a building erected by the Indonesians, the centre will initially appoint a core of only three interdisciplinary staff. They will be assisted by a team of short-term consultants drawn from the universities.

The project has been planned on a very modest and austere scale - with a budget of \$716,500 a year for the first three years - because much of its research and development expenditure will be incurred by participating governments, who will frequently use the regional universities' scientific staff and technical facilities.

In the second phase, starting in 1985, the centre will establish its own experimental farm.

The centre will serve an area extending in the west to the Cook Islands in the Pacific and from Mongolia in the north to New Zealand in the south. The centre will need to overcome differences of language, culture and academic tradition as well as politics as it establishes a regional network to enable participants to swap experiences.

One experience shared by much of the region has been the impact of the "green revolution", which resulted from research and development in the 1960s and led to big increases in wheat and rice yields. But only about a fifth of the region's farmers have managed to exploit its technical achievements - the rest have been excluded by their lack of irrigation or funds for seeds and fertilizers.

The new centre will study crops which are produced by the poor majority, frequently marginal and even subsistence farmers. Specialists blame their poor productivity performance on inadequate and uncoordinated research as well as insufficient credit and marketing facilities.

In the long term, the action-oriented research programme may spearhead fundamental improvements in the livelihood of hundreds of millions of poor farmers.

The centre's first priority will be the creation of an institutional framework for cooperation in research, development and training. Apart from science and technology, the centre will coordinate agro-economic and socio-economic studies on production constraints and the potential impact of increased crop yields on income, employment, marketing and other factors.

The project will contribute to improved nutritional standards and increased farm income through a multidisciplinary approach to research, agricultural extension services and infrastructure development.

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TT3

## Intellectuals gather to honour Walesa

from Donald Fields

STOCKHOLM

As the name of Lech Walesa started to reappear in the headlines this month, many of eastern Europe's pre-eminent writers and thinkers were appearing at a seminar in Stockholm honouring the founder of Polish Solidarity.

Entitled "East and West Europe: a new connexion?" the seminar was held in conjunction with the award of a freedom prize to the absent Mr Walesa by two newspapers *Dagens Nyheter* in Stockholm and *Politiken* in Copenhagen. It was an implicit, occasionally explicit, reminder of the responsibilities that the western intelligentsia might feel towards the hard-pressed people of the Soviet empire.

The principal speakers were Polish-American writer Jerzy Kosinski, Hungarian writer Gyorgy Konrad whose homage to Walesa struck just the right chord: the Romanian-born researcher in international relations Pierre Hassner; Czech Zdenek Mlynar, a minister in the ill-fated Dubcek government and an instigator of Charter 77; Hungarian American Andrew Arato, of the New School for Social Research in New York; and Poles Miroslaw Ciolek, a member of the KOR social self-defence committee and director of the underground NOWA publishing house, and Krzysztof Pomian, philosopher and historian.

Completed by two authors (Gustav Herling-Grudziński and Horst Bienek) who survived Stalin's gulags, and the leader of Solidarity in western Europe (Jerzy Milecki), the list bore testimony to the tragic brain drain away from, and the demoralization of the intelligentsia within, Communist-ruled societies. All except Konrad, who is completing a year's scholarship in West Berlin, are exiled.

Most of the proceedings were devoted to accounts of the continuing opposition movement in Poland and historical interpretations of eastern Europe's present plight, with a vivid impression made by Gyorgy Konrad's plea for a dismantling of the Iron Curtain and the withdrawal of Soviet and American troops from the continent.

Krzysztof Pomian gave a paper illustrating how the Polish people had retained a knowledge of climatic events in national history that the Communist regime preferred to ignore or distort in official school education.

American Dr Jean Cohen, found analogies with Solidarity in western, social movements related to peace.

Perhaps the most vivid memory came as the national fireworks started to fade. It was provided by an unexpected visitor, the exiled Soviet dissident Alexander Ginzburg. His spontaneous, five-minute address ended with the words: "What is important for human beings is not the system, but freedom."



Graffiti encourages islanders to enrol at the new centres for popular education

## Learning a little to get ahead

by Paul Flather

Evelyn is 56 and has worked as a domestic servant nearly all her life. Now she wants to learn some maths, and the history of her native Grenada. She is one of 30 people sitting in a dimly-lit wooden school hall listening to details about a new Centre for Popular Education about to be opened in her district of Mornejaloux.

"You have come here to learn," explains Richard Duncan, one of the teachers. The point is to consolidate what you learned in school, he says. It's no use being able to read and write if you are frightened to use it."

Adult education is seen as a key part of the tiny Caribbean island, just 21 miles long and 10 miles wide, which lies about 90 miles off the Venezuelan coast. It is seen as the way of improving "functional" literacy, of providing new training, and of allowing people to find their potential.

The Prime Minister, Mr Maurice Bishop, hopes that between 7,000 and 10,000 people will have enrolled at 65 centres for popular education by the end of 1983, which he has dubbed the Year of Political and Academic Education.

"Our overall objective is to make the country a big popular school," he said in his New Year address, and his People's Revolutionary Government

has put its money where its mouth is. In 1981 21 per cent of the recurrent budget went on education, and last year it went up to 22.5 per cent.

On a brief stop in London this month Mr Bishop discussed the problems of the campaign. "I think we are doing reasonably well. We have so far enrolled about 4,000 people, and most have been attending," he said.

The problems faced by Grenada are illustrative of all less-developed nations battling against illiteracy. "You know it's not easy to persuade people who have got to use their lives to work, and finish early, to also go out again in the late afternoon for classes," Mr Bishop said. "But for us it is an important investment."

Grenada has mainly an agricultural economy, based on exports of cocoa, bananas, sugar, juices, and, above all, nutmeg. A World Bank report in 1979 estimated 15 per cent of all Grenadians were illiterate although Mr Bishop claimed the figure was nearer 5 per cent.

The literacy classes are friendly and informal. The aim is to put everyone eventually on O level courses and the government is considering better pay for those who do well.

The PRG inherited some serious problems when it took power in a bloodless coup in 1979. Only one in

three primary, and one in four secondary schoolteachers were trained and almost all the 60 secondary schools needed urgent repairs. Education was seen only as a way of becoming a "big man", and higher education as a way of escaping the island and hard work. According to Mr Didacus Jules, permanent secretary at the ministry of education, low levels of training were compounded by a very authoritarian structure and a very European outlook.

"Adult education is a top priority for us," Mr Jules said. "It is the way for us to move beyond the primitive technology of the cutlass and fork and prepare ourselves for the new technology."

Some £180,000 has been earmarked for school repairs this year, four new agricultural training schools have been set up, new reading books relevant to a Caribbean way of life are being produced, and there has been a marked increase in the numbers of overseas students. Last year 350 went abroad, mainly to Cuba, but also to Africa, the USSR and the University of West Indies.

One of the slogans of the adult education programme runs that "CPE takes you from where you are to where you want to go." Evelyn signed up immediately. "It is my first chance since I was 14 to learn about myself. I am not going to miss it," she said.

A specialist in international law at

Bonn University, Mr Christian Tomuschat, said that nearly all West European countries tried to keep extremists out of public service. But only Germany applied the same yardstick to both the "under-secretary and the grave digger." Elsewhere, he said, the chief consideration was one of security, whereas West Germany demanded loyalty to the constitution.

The German system of excluding extremists from the public sector is based on an agreement between the *Laender*, or states, in the early 1970s. It is interpreted with varying degrees of strictness from region to region, depending on the political colour of the local government.

A specialist in international law at

## Union fears West German crackdown against 'extremists'

from James Hutchinson

BONN

A trade union representing West German university teachers is concerned that the new centre-right government may tighten the regulations hampering political extremists from public service - a practice which has led in the past to the rejection or dismissal of many teachers and, in one widely-publicized

case, to the sacking of a train driver on the grounds that he was a member of the Communist Party.

The union is particularly worried about a recent decree by the Bavarian government which requires civil servants to support decisions of the government and to steer clear of groups whose aims are "incompatible with the free democratic order". This rule, it is thought, is probably designed to deter

people from joining such organizations as the peace movement.

The German system of excluding extremists from the public sector is based on an agreement between the *Laender*, or states, in the early 1970s. It is interpreted with varying degrees of strictness from region to region, depending on the political colour of the local government.

A specialist in international law at



Its new - and female - general secretary firmly at the helm, the university lecturers' union will next week carry the campaign for women in the universities a stage further.

The Association of University Teachers is to hold its first representative conference for women members and Mrs Diana Warwick, who takes over fully from Mr Laurie Sapper on Tuesday, is to be one of the main speakers.

The main task for the Bath conference will be to elect a national committee to advise the union's executive on issues affecting women members. Six committee members will be elected annually from the conference - and two by the executive. So far 13 nominations for the six elected places have been received and attendance at the conference is expected to be up to 150 delegates and observers from all over Britain.

The committee will be the union's fourth national advisory committee - but the first whose activity is defined by gender rather than function.

The AUT's interest in the difficulties faced by its women members over job security, promotion prospects and pensions equality predates Mrs Warwick's appointment and the establishment some four years ago of the working party which spawned next week's conference and the elected committee.

But one of the discoveries made during a workshop last autumn was that existing policies on equal opportunities were not widely known. The framework exists, and the advisory committee will help the executive to flesh it out and campaign for its active application.

In 1979 in a charter seeking equality for women within the trade unions the TUC called for national executives to consider the desirability of setting up advisory committees to ensure the protection of women's special interests. The initiative was partly a response to the growing awareness of the second class status of women in the labour market - and partly an attempt to fuel a drive for greater participation by women in union decision-making. The TUC was acutely aware that many of the worst discriminatory practices were - and are - to be found among the ranks of affiliated unions.

While colleges - such as the AUT and other teacher organizations with a high proportion of female members - were not to be counted among the offenders. But there was

## Breaking down the barriers of academic machismo



Dian Warwick... the AUT's new general secretary will be a key speaker

a recognition that the education system was at the root of much institutionalized sexism and barrier building in society.

The Equal Opportunities Commission is known to be concerned at the underachievement of women and girls in the education system. At the instigation of the AUT, the EOC also tackled a study of the reasons women working in the universities also failed to do as well as might be expected from their abilities in the university service.

It found that women formed nearly 16 per cent of the full time staff. While 44 per cent of senior library staff and 26 per cent of administrative and research staff were female, only 10 per cent of academics were women.

Part-time staff with academic functions accounted for just 1 per cent of the total - but 45 per cent were women.

In salary terms, only 18 per cent of women were above the career grade of lecturer, compared with 40

per cent of men who were in senior posts. Only 3 per cent of professional posts were held by women.

But, according to the AUT, the suggestion that the universities might be less than fair in their treatment of women is laughed out of court by the vice chancellors, who earnestly believe appointments are made solely on merit.

Prospects for women are worsening, confirmed Mr Alan Taylor-Russell, chairman of the equal opportunities working party. Not only are women heavily over-represented among short contract staff who are most vulnerable to the cuts, but they tend towards areas least favoured both by ministers and the University Grants Committee.

A discussion document next week suggests a programme of positive action at institutional level to ease the problems. It says all selection panels should include at least one woman AUT representative - and specific consideration to her views should be

### David Jobbins previews the AUT's first conference for women members

given before decisions are made.

Promotion patterns should be carefully monitored and child care, maternity and paternity leave and job sharing arrangements negotiated.

Motions for discussion range across issues such as provision of creches and the discriminatory nature of the universities pension scheme to the more controversial establishment of quotas for female staff and students.

The working party has firmly resisted suggestions that proposals for popular action discriminate in favour of women and against men.

"The term positive action can perhaps most usefully be seen as involving a systematic programme of steps in areas like women's employment, education and training which is designed to combat the effects of past and present inequalities and actively to promote women's equality without creating reverse discrimination against men," says the union's official bulletin.

Debate is likely to centre on whether this is enough - or whether at least a period of positive discrimination is needed to remedy the institutionalized injustices of the past.

At the September workshop it was generally agreed that existing promotion criteria worked against women by minimizing the importance of teaching. Irrespective of informal criteria, "academic machismo" worked against women.

There was a word of warning which will be ringing in the minds of delegates next week from Mr Keith Scribbins, assistant secretary of the National Association of Teachers in Further and Higher Education, and one of the key architects of the college lecturers' policies on women.

Women's rights policies should not

be seen in isolation but must be translated into unequivocal trade union claims with which to confront the employers, he said.

Natthe has a national women's rights standing panel to advise the executive - but its members, not all women, are elected from the union's regions with a further five from the union executive.

A key debate at next month's National conference is the pace at which positive action and reserved places for women within the union's structure can be forced.

Resolutions calling for immediate action are likely to be met with an appeal from some supporters for a delay to ensure details are properly worked out - and to avoid the possibility of alienating members of the union opposed to further rule changes so close on the heels of the debate over affiliation to CND.

Next week's conference stems directly from a resolution passed by the September workshop and adopted by the national council last December. It set in train the mechanism for establishing the representative machinery - but its creation does not mean the end of the road for the equal opportunities working party.

It is to continue working to a brief laid down by the same council to examine the problems of race discrimination and access for disabled people to universities. The issue of sexual orientation also remains firmly on the equal opportunities working party agenda.

Enormous efforts have been made to eliminate trade union "macho" from next week's conference. Much of the hard work will be done in workshops away from the sometimes intimidating - even for university lecturers - formal debate on motion or amendment. And the chair is to be held by the three co-opted female members of the working party in rotation rather than by the president or vice president.

Universities' much-prized self-declaration as bastions against discrimination has, according to one member of the working party, led some academics into believing that it actually works. The new national committee is expected to put the AUT into greater efforts into putting real meaning into the lofty words of so many university charters which blithely state discrimination should not end therefore does not exist.

Jon Turney and Felicity Jones report on two aspects of artificial intelligence

## The computer as a teacher

It is not immediately obvious what a conference on "Artificial Intelligence and Education" will be about. Chalk-wielding robots? Space-invaders in peace studies? Or injections to boost dull students' exam scores? A glance at the conference programme was some help - I was to hear about some uses of computers in education. But understanding was still clouded by an abundance of acronyms - the computer buff's tribal insignia. Each speaker seemed to be an enthusiast for a particular programming language, with its own specialized syntax, or particular system, all with upper case names like POP11, PLATO, SCHOLAR, or CODIL. And the two programming languages which seemed most popular were called LOGO and PROLOG. These, I gathered, were different, although of course you can implement LOGO in PROLOG - to give PROLOG.

However, any tourist benefits from a guidebook, and Edward Feigenbaum's magnificent three-volume *Handbook of Artificial Intelligence* helped me feel more at home in the AI environment (a favourite term - as in "programming environment", or "learning environment"). Put simply, artificial intelligence means making computers do things that people can do. That is, AI means programming computers to tackle problems whose solution is generally seen as a hallmark of human intelligence.

This definition indicates the level of AI researchers' ambitions, and the reason the field is often controversial. The problems studied can range from very simple ones (for people), like sorting wooden blocks into columns or sizes, to specialized intellectual tasks like chemical analysis using spectroscopy.

Work on this range of problems involves deep study of human perception and cognition, of modes of inference and ways of representing knowledge. Some AI projects seek to match or improve on human performance in, say, chess, without using the techniques of human players. (And the world backgammon champion, by the way, is a computer.) But the areas of the subject which focus on human learning and human reasoning as possible models for machine intelligence are more likely to produce systems with educational applications.

The conference, organized by the Society for Study of Artificial Intelligence and Simulation of Behaviour (AISB), was timely for two reasons. First, artificial intelligence research in British universities is expanding rapidly after years of neglect. The challenge of Japanese and American programmes to enhance computer power has dispelled the shadow cast by a report to the Science and Engineering Research Council from Sir James Lightill in 1972 - which was sceptical about the future prospects for AI.

And just as quite a number of "new blood" appointments are helping work life in university laboratories, some of the earlier fruits of that work are beginning to find their way into schools, if not yet college lecture theatres. So the AISB meeting at Exeter University was an opportunity to assess the state of the field and its likely impact on education in the future, even though it could only be a snapshot of a fast-developing discipline.

The central feature of my snapshot would be the so-called "expert systems". These are the artificial intelligence prize exhibit, and various forms of expert system were mentioned by speaker after speaker. They are usually seen as examples of intelligent, goal-directed man-machine systems, related to contemporary politics and especially the investigations of the House Committee on Un-American Activities might alter the critical judgment.

In broad terms, whether the method should be quasi-clinical and narrow, or context-rich and wide, will of course remain a matter of debate, but there is little doubt that the new materials of popular culture will eventually require a re-appraisal of traditional critical methods.

should be able to explain its decisions in terms that doctors could understand, and that it could improve its own knowledge easily by dialogue with experts in microbiology.

The knowledge programme has been represented in a series of rules which are conditional statements which tell the computer about inferences it can draw, such as: "If a bacterium is a gram positive coccus growing in chains, then it is likely to be *Streptococcus*". Combining large sets of these rules gives the programme the power to make recommendations as good as those of the human experts. And when a specialist user identifies a source of error, old rules can easily be altered, or new ones added without rewriting the whole programme.

MYCIN shows several of the characteristics which make AI systems attractive to educational technologists. It is designed for two-way exchange with the user, and its ability to explain itself looks more promising than the host of computer-assisted learning packages which can only offer simple question-and-answer displays, for drill and practice in a set of facts.

And the "if... then" rules used to illustrate how high-level programming languages can support systems with straightforward units of expression. You don't have to worry how the whole business is ultimately transformed into the binary sequence of 0s and 1s which is all computer hardware can understand to get a reasonable grasp of MYCIN's logical principles.

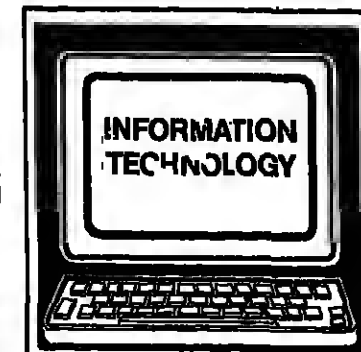
Moreover, in its own narrow domain (and expert systems are confined to narrow domains), MYCIN already has properties useful to a student. In a book published this summer, *Learning and Teaching with Computers*, Tim O'Shea of the Open University and John Self of the University of Lancaster point out that the non-expert can interrogate MYCIN to learn its diagnostic rules. "Since MYCIN can explain in English what it is doing, the student could be provided with a way of interrupting MYCIN to ask why a particular question has been asked... Or perhaps MYCIN would be modified to print out step-by-step explanations while working through a diagnosis," they write.

Work to adapt MYCIN in this way is already in progress at Stanford, where William Clancey developed a system, OUIDON, which has 200 or so extra rules for managing a student tutor. The teaching component of this programme was quite successful, but it also showed the limitations of MYCIN's knowledge.

Unfortunately, MYCIN's set of rules does not bear much resemblance to the way an expert physician arrives at a diagnosis. And as O'Shea and Self point out, the programme can answer questions about an individual case, but does not generalize and say: "The way to carry out a diagnosis is...". They continue: "It may seem unreasonable to expect such explanations from a programme, but... that is after all what a MYCIN tutor would be trying to teach."

Dr Jim Howe, head of the Department of Artificial Intelligence at Edinburgh, said that much deeper models of cognition would be needed before expert systems could be developed which could reproduce their knowledge in a way which would be helpful to students in higher education. He agreed with O'Shea and Self that MYCIN's knowledge was very shallow - it could explain rules, but not the principles on which rules were based. And this was true of expert systems in general.

Nevertheless, other features of several programmes were clearly a strong influence on the work of Kowalski of Imperial College, London, said that the system his group had developed for introducing schoolchildren to the joys of the language PROLOG was closely related to work in his department on writing expert systems in the same language.



Kowalski's work stems from his strong conviction that PROLOG, which is based on the problem-solving power of mathematical logic, is the prototype of the high-level languages which will be needed for the truly intelligent systems of the future. His position, in a research community largely wedded to the older language LISP (for LISP Processing), has suddenly become much more influential with the adoption of logic-based programming by the Japanese in their highly ambitious "fifth-generation" project.

This sharpens up the debate about the relative merits of PROLOG and its more fashionable LISP-derived competitor, LOGO, developed by Seymour Papert at MIT. While many speakers argued that it was better to have several programming languages at one's fingertips, the first language learnt will be as vital a touchstone as the first natural language. And that first language will soon be learnt, in outline, long before the computer-literate pupils of the future leave school.

Whatever the outcome of this debate, Kowalski's description of his interactive PROLOG system was intriguing. For example, a programme to identify nationalities and citizenship (a complex legal question at present) solves problems by drawing on its own stored knowledge, and asking the user questions if it does not know enough to answer the original query.

The user becomes an extension of the system, "logically no different from a memory disc", according to Professor Kowalski. His aim was to make his property symmetrical, so that the user could also ask questions of the machine. In the end, input and output would become the same, depending on one's point of view. The system knew what it had been asked, and what it had been told, and responded accordingly.

So the result of a query to such a system - for example, One might ask a programme on social security law about entitlement to benefit - is a dialogue in which information passes both ways, with the answer emerging at the end. "This is the beginning of extracting from expert systems what they are about," said Kowalski.

This is still a far cry from a programme capable of helping a student through the kind of material in a university or polytechnic course, but it helps define the capabilities such a programme needs. Derek Sleeman, a British researcher working at Stanford, suggested that the area in which expert systems, or "nides", would benefit from efforts to develop intelligent tutoring systems was user modelling - the system should pick up the user's level of knowledge and tailor its responses to fit.

An intelligent tutoring system needs a "student model" programme into it - a model which can be modified by changes in the student's apparent competence and in turn modifies the tutor's output. Artificial intelligence abounds in hard problems, but this is very hard. Setting up a student model means having some idea about how students learn to solve problems. If the output from an expert system isn't quite on target, the person whose knowledge is being incorporated in the computer will know - that's why this work can proceed. But a group of students can't tell you how to master a subject they haven't learnt yet. They probably can't tell you afterwards, either.

So the artificial intelligence has to have to work this out for themselves, and when you see how far they have got it's easy to understand why AI-based systems are still confined to simple uses in schools. At the moment most work focuses on student

After the official discouragement of research and study in artificial intelligence in this country following the Lighthill report in 1972, the stimulus being presented by the Japanese plans to develop fifth generation computers based on logic programming has begun to reawaken interest again across academic disciplines.

This renewed interdisciplinary interest was reflected recently in an Anglo-French colloquium on "The Mind and the Machine" held at Middlesex Polytechnic in cooperation with LIME University. The emphasis of the conference was on the philosophical questions thrown up by AI but the papers presented ran across a wide field from linguistics to psychology.

One of philosophy's age-old obsessions has been the relationship between mind and body. The "ghost in the machine" has been a prominent ever since Descartes used his *cogito ergo sum* argument to prove that he was not the victim of some evil demon who was tricking him into believing that the world and everything in it, including his own body, existed when in reality it did not.

Who am I? How do I know that I am not the only one here (everything else being a product of my own imagination)? Is there a soul? These have been questions central to philosophy linked with problems to do with personal identity, free will and determinism.

Now the search for a thinking machine, and programmes which simulate human thought and the acquisition and use of knowledge has provoked these questions all over again. As computer scientists explore the rich seams of mechanistic, computer intelligence, the meaning of consciousness is thrown into relief.

This fertile field is making people reassess the relevance of concepts like "mind" and "body" and what exactly the difference between them is. In a paper, Aaron Sloman of Sussex University put forward the view that it was fruitless to argue about where the boundary should be drawn to preserve the essence of "mind".

In the same way that there is no essence of the game of chess, unless Wittgenstein's example, only a family of rules which could imaginably be changed to make the game harder or provide some new strategies. So instead of trying to divide the world into things which have or have not consciousness, it is more profitable to examine the similarities between types of computer systems and human abilities.

Philosophers, he argued, can contribute to AI by analyzing conceptual confusions and clarifying such ideas as to whether in fact a computer-like mode of mind does degrade human beings? And in turn, the computer scientist's models can provide a deeper understanding of the nature of the human mind.

Professor Margaret Boden, also at Sussex, was in no doubt that AI had given us a new standard of rigour and appreciation of the importance of mental processes. "Linguistics already had rigour but no process, psychology has little of either and philosophy has less of each," she stated.

It seems that those in AI need to analyse the concepts with which they are dealing much more rigorously if they are not to fall into the traps from which philosophers have been trying to extricate themselves for centuries. Philosophically, the presuppositions with which they are playing are highly unstable and if AI is to be taken seriously then it too has to learn from the past and build on the traditional lessons learned in logic, philosophy, linguistics and psychology.

modify the third component, the "student model", which then makes predictions of student performance which are passed to a unit choosing the "teaching strategy". Finally, the chosen teaching strategy passes to a "teaching generator" which chooses the best item for the next exchange between the student and the teaching administrator, completing the cycle.

The modular design means that the parts which contain rules like those found in an expert system, the student model and the teaching strategy - can be kept relatively simple, and their outputs predicted fairly accurately.

This system can handle teaching tasks like imparting the secrets of a photocopy to a prospective repairman quite well. But this is not a teaching style anyone in a college or university would be very happy to adopt. As Jim Howe pointed out, good university-level teachers don't do much teaching in the sense of simple instruction. They act more as guides and advisors to students choosing their path through a great mass of material in their chosen discipline. And that looks like remaining a human preserve for the foreseeable future.

## Think about IT...

"The inadequacy of theoretical approaches that fail to recognize the complexity of mental structure and process is now evident and psychology and the philosophy of mind have been influenced accordingly." Professor Boden is recognized as one of the major figures in AI in Britain.

It was a tragedy in her view, that the Government opposed its development early on, forcing many people to go to the United States in order to carry on with their AI work and leaving a gap in this country which it will be hard to bridge.

Sussex University had the first unit in cognitive studies with an interdisciplinary content where students can major, doing five ninths of their work, in philosophy, psychology or other subjects together with two ninths in artificial intelligence. And starting from the next academic year, students will be able to major in AI.

An example of the way philosophical analysis can bring some light to bear on the enthusiastic mode-building of present day computer scientists was given by Victor Wilks of Essex University. After he had stated in his paper that AI workers were "by and large, naive materialists and mechanists" whose job was to get on with simulations of ourselves, he counter-acted the prevalent view that consciousness could be thought of in terms of interconnecting modules.

Most modern computer programmes, especially those in AI, are written in terms of modules which do not have access to other modules; as Carl Hewitt of MIT put it: "Modules shouldn't be able to wander around with the bodies of their neighbours".

But in response to this essentially Leibnizian view of a world broken down into "modules" or individual units, Wilks argues for "levels of consciousness", as much more acceptable model for the mind than that of modules.

He admits that there is nothing new in this idea since mystics have always talked in terms of levels, as have the nineteenth-century vitalists. But more important, what his paper highlights are the assumptions with which computer scientists are operating.

It seems that those in AI need to analyse the concepts with which they are dealing much more rigorously if they are not to fall into the traps from which philosophers have been trying to extricate themselves for centuries. Philosophically, the presuppositions with which they are playing are highly unstable and if AI is to be taken seriously then it too has to learn from the past and build on the traditional lessons learned in logic, philosophy, linguistics and psychology.

## Today's cultural dross becomes tomorrow's gold

### Dan Gillan on popular culture in the academic context

The appropriate role for popular culture in traditional disciplines is a topic which generates heated debate among academics. The recent conference of the British Association for American Studies in Edinburgh proved to be an ideal opportunity to canvass opinions and ideas on this topic from a variety of angles. Broad fields of inquiry, such as American studies, which require an interdisciplinary approach, are often highly suspect to academics reared in traditional blinkers to "find out more and more about less and less".

If the interdisciplinary approach itself is not sufficient provocation there is also the nature of the material examined during such inquiries - in particular popular culture. In the academic context this may be defined as anything which a significant number of people choose to experience for recreation and pleasure rather than education or moral purpose.

Any attempt to evaluate popular culture brings into question the traditional ethical divide between what is "worthy", and so implicitly right for study, and what is merely pleasurable, and so implicitly facile.

This often perverse distinction, which usually also links pleasure with commercial success, ignores the cyclical progression of cultural history. In so much drama, literature, music and art increased familiarity, either engineered by intellectual special pleading, or self-generating in "pleasure" terms eventually converts the dross of popular culture into the gold of "high" culture. With equal inevitability much of yesterday's unpopular culture becomes today's staple; there is a move from both extremes towards consensus culture.

Meanwhile artists, writers and composers - prime movers - are continually revitalizing their fields of endeavour. In search of an audience for the latest masterpiece. Creators for the most part create independently, while the critic and academic trail in their wake - in academic terms this usually means a "safe" period of about 10 to 20 years.

Thus a steady stream of anxiety is caused by the rolling academic "avant-garde". In his lecture "Bob Dylan: can this really be the end?" delivered at University College, Wales Aberystwyth in March 1982, Professor Christopher Ricks claimed with a barrage of examples from Dylan's lyrics, that by any criteria, this singer/writer should be acknowledged as a major poet, approaching the quality of Shakespeare or Wordsworth, a claim greeted with polite interest but a certain reserve by many of his listeners.

At Exeter University reggae and blues are studied both for their intrinsic qualities and for the light they shed on wider cultural concerns.

Dr Mario Maffi at the Instituto d'Anglistica in Milan agrees with this approach, and is particularly interested in the middle ground between social history and literature round about the turn of this century. He said: "I feel the need to give a more complex idea of American society to my students, above all of urban culture, which is as much a visual culture as one you can study in books. To understand how the masses are viewed by observers and writers, the student must also see them and hear the sounds and songs of the period".

Friendship with Ewan MacColl and

Peggy Seeger has helped him to appreciate the importance of folk-song and popular entertainment in understanding social patterns and problems.

This approach can be rapidly dismissed as "anecdotal not critical" by purists. But Maffi absorbs the intended approach. "Anecdotes can serve the literary or the cultural critic, they are not didactic, not pre-emptive reaction of a person to something; in a sense it's another interdisciplinary approach. Of course if it comes to 'anecdote' only, that is a good, but let it serve as a help, if it can make literature or history more accessible."

The photograph can be the visual equivalent of anecdote, which removed from its purely aesthetic context and related to wider culture. Ralph Bogardus, an associate professor at the University of Alabama came to study photography via literature - his dissertation was about the collaboration between Henry James and Alvin Langdon Coburn who created the photographs for James' definitive New York edition. James directed Coburn in a "scene", rather like a film director directs a movie, to make a series of images "that would work as symbolic frontispieces for each of his volumes".

Bogardus also looked at a whole range of other apparent influences on photography on James. The possibility of photography influencing literature was not new - "Naturalism" or literary realism in the nineteenth century was often accused of being photographic - of course this was a pull-down. Critics said it was like a journalist's report, so therefore the content was not art, it's a reportage and would be dismissed.

His current concern is with a very different sort of photography, that of

Vic Howard in Harlan County, Kentucky. Bogardus terms this modest commercial photographer an unknown "visual anthropologist". The 30,000 negatives made between 1940 and 1970 reveal a community at some of its important moments - only some, because, as a result of indirect pressure from the mining companies, he deliberately avoided coverage of the strikes and other violent confrontations which have made the district notorious. This less agreeable side was vividly portrayed in the award-winning film *Harlan County, USA*.

A great deal of research has gone into the history of photography, but comparatively little thought has been given to a conceptual scheme that will cope with the special qualities and characteristics of the still image as opposed to the moving image. At that "frozen moment", the interaction between photographer and subject needs to be defined; notions of reality and truth can be radically altered by the confrontation. Bogardus cites the example of Jacob Rika who used the photograph to "expose social evils" and who thought he was showing an objective reality, whereas careful analysis that he constructed his reality by selection and framing, to suit his purpose.

It is exactly this note of critical caution that is taken up by Olaf Hansen, who teaches at Frankfurt University. In discussing the work of the photographer of the same name, he stresses that there must be a rigorous framework of analysis if popular culture is to achieve academic respectability. "We are under an obligation to use theoretical work, otherwise we'll always be accused of just showing illustrations."

Photos need documentary backup.

as it is very easy to misinterpret an image, but careful scrutiny can reveal a great deal - he points out the man with a Bauhaus pattern on his tie in one of Howard's celebratory photos: the bold geometric design apparently reached Harlan County via a Sears Roebuck catalogue, a somewhat unusual path of cultural diffusion.

Film studies, while still suspect in some quarters, have an advantage over studies of other cultural artifacts. So far, the only "theory" because film has developed, particularly over the last eight or so years in this country, a specific methodology and critical approach which has given it a sort of academic respectability.

Richard Malby, whose course at Exeter has been dismissed by some senior members of arts faculty as a "picture-book course", said that another advantage of film studies was "the absence of a panacea of respected texts which have to be dealt with".

The implication of this is that a more direct approach can be made to material such as *Out of the Past*, released in November 1947, a low-status Hollywood product which has been made more important for us than it ever was at the time by its critical process. Its characters are usually seen as examples of alienated, existentialist man; but more rigorous analysis, related to contemporary politics and especially the investigations of the House Committee on Un-American Activities might alter the critical judgment.

In broad terms, whether the method should be quasi-clinical and narrow, or context-rich and wide, will of course remain a matter of debate, but there is little doubt that the new materials of popular culture will eventually require a re-appraisal of traditional critical methods.



## Army stages a tactical withdrawal



Nick Caistor looks at the post-Falklands intellectual climate in Argentina

According to leading physicist Dr Jose Westerkamp Argentina's universities have for the past few years been experiencing "the peace of the cemetery". But the next few months are likely to be much livelier.

After seven years in power, and largely due to the Falklands disaster, it seems that the armed forces are finally admitting that their original aim of "reconstructing" Argentina has failed. They have promised elections for October, with the handover of power to the winners early in 1984.

They are hoping that this can be achieved without political turmoil and without too close an investigation into the way they have run the country since March 1976. Their withdrawal from power has come less because of a direct challenge from social and political opposition than as a result of their patent incapacity to resolve any of Argentina's pressing problems. This exhaustion of ideas and alternatives is clear from their approach to education.

In 1976, the area of education, and in particular the universities and teacher training institutes, was a prime target for the "cleansing" operation the armed forces deemed necessary to rid the country of ideological subversion. Their first priority was to eradicate any left-

wing Peronist supporters still on the staff from the early 1970s.

There was a massive witch-hunt of both staff and students, and in some cases, such as that of the economics department at Bahia Blanca, or the National Geophysics Research group, entire departments are dismantled. University autonomy was revoked, and all political debate was banned from the campuses. Even after the initial purges, plainclothes police were among the universities' most regular attenders, and both students and staff were kept under close watch.

The second stage was to reform the curriculum, suppressing anything considered ideologically dangerous, while at the same time removing many courses from the universities altogether. There was also a concerted effort to keep down student enrolments. Whereas under the Peronist government any student successfully completing secondary school had the right to enter university, now entrance exams were introduced, and the numbers of students for the more popular courses were limited drastically.

The ministers of education appointed by the successive military presidents all stressed that the old Argentine dream whereby every working class immigrant's son would



Human rights demonstrators in Buenos Aires demand information on people who disappeared in the 1970s. The boot on the cross symbolizes oppression

become a doctor, engineer, or lawyer (and his daughter a psychologist) were over - the armed forces were not interested in social mobility, preferring a stable society in which the rich enjoyed educational privilege and the poor were to be content with their station in life.

To reinforce this privilege, the third strand of the military's education strategy was the active promotion of privately funded universities and colleges. The only success story over the past seven years in education has been the Universidad de Belgrano, and it is no coincidence that this confident, expanding private university is situated in one of Buenos Aires' most exclusive neighbourhoods.

In addition to this, the burden of financing public education was as far as possible transferred from the central government back to the provincial authorities, thus exacerbating the already great difference between the opportunities available in the rich coastal areas around Buenos Aires and the poorer regions of the interior, particularly in the north and west of the country.

Higher education suffered most of all though from the armed forces'

lack of any coherent initiatives to bring progress to Argentine society. With inflation over 100 per cent year after year - the official figure for 1982 was 210 per cent - the different education ministers gradually became content if they could just manage to pay the wages. The present minister, Cayetano Licciardo, admitted recently that up to 85 per cent of this year's education budget will be spent on this.

The defeat in the Falklands appeared to stun the armed forces in Argentina more than anybody else. It forced them to the decision to let the politicians find solutions to the country's economic and social problems while they themselves went about the task of re-equipping and re-thinking their role.

The promise of elections has created an atmosphere combining often euphoric relief and the anxious awareness that it is now - and in education as much as anywhere else - that the true "reconstruction" of the country must take place. And during the period of interregnum, everybody is trying to avoid doing anything which might fall foul of whoever eventually does come to power. As Dr Licciardo put it recently: "I'm not here to inno-

vate - just to hand over in good order to a civilian government".

This means in practice that strenuous efforts are being made to carry out what is euphemistically termed the 'normalization' of higher education. The different establishments have been asked to submit new statutes for government approval, after which they have been promised that they will regain their autonomy, and will be allowed to choose their own permanent staff.

This issue of staff selection is the one likely to generate most heat in the coming months, since everyone is aware that appointments made now are probably going to be questioned by the incoming civilian authorities.

This will be especially true if, as seems quite possible, the Peronists win again triumph in the elections, since they were the party thrown out by the armed forces in 1976 and have many scores to settle.

In the run up to the elections, the parties are more concerned with the grander matters of global economic strategy, what to do with the armed forces, and the general question of human rights to promise anything specific for education.

## Disposable dons down under

Academic gypsies, they're sometimes called in Australia, but they're actually disposable dons. They cart their wives and kids from one position to another every three or four years," says one observer. "I employ someone in my own department who has had four jobs in six years in three different states."

Some however, step off the academic ladder when they find it has only one rung. They take their bright minds and creative imaginations into business and industry or the public service, where people usually keep their jobs if they prove they can do them.

Altogether, about one in five academics, 11,000 or so university academics lack the security of employment most Australians take for granted. A slightly smaller proportion work in the colleges of advanced education. They are part of a growing group in higher education: people who hold their posts for limited periods of one to five years. The jobs themselves are short-term contract appointments, fixed term positions.

The tendency for universities and colleges to create more and more of these posts is a threat to academic freedom and the fulfilment of an academic's potential - according to university and college staff associations. Yet an Australian senate inquiry into academic tenure last year recommended that the proportion of non-tenured staff in higher education be increased to at least 10 per cent of those in the class of lecturer and above.

Moreover, a confidential paper prepared by the Tertiary Education Commission goes even further. It recommends that institutions should aim to achieve, within a decade, a proportion of limited term appointments among staff at lecturer grade and above that is twice the 10 per cent recommended by the senate committee.

For five years, a little publicized but vigorous and at times acrimonious debate has been going on between university staff associations and administrators about the increasing number of contract staff appointments. Now the Federation of University Staff Associations has launched a campaign against the appointment of untenured academic staff and is also lobbying politicians on the issue.

To understand the fierceness of the argument, one needs to look at how Australian universities are structured. At the top are the professors, now numbering about 1,100 in Australia. Below them are the associate professors or readers, then come the senior lecturers, lecturers, senior tutors and tutors.

Professors and readers, almost without ex-

ception in Australian universities, occupy tenured positions. This means their jobs are virtually guaranteed until retirement, no matter what the quality of the incumbent.

At the bottom of this academic totem pole are the tutors who are more numerous than professors but who have no job security to speak of, whose appointments are limited - often on rolling, one-year contracts - and who may not be told until late in the year if they are to have a job the next. Temporary tutors are sometimes employed in March and sacked in November. As with fixed term lecturers, few universities offer tutors superannuation, long-service leave, housing assistance, access to conference leave or outside studies programmes.

Vice chancellors sometimes speak of tutors as academic apprentices, but the federation says this is nonsense. Whoever heard of a 35-year-old apprentice, married with two children and five years post-doctoral experience? "It's not an apprenticeship for an academic career, but rather one for unemployment," says Jacqueline Smith, a senior tutor at Macquarie University.

In the middle of the university chain of command are various grades of senior lecturer and lecturers. Today, on average, more than 20 per cent of lecturers hold non-tenured positions, compared with just 12 per cent nine years ago. At the lecturer level the fixed-term contract is now no longer an unusual alternative to probationary employment leading to tenure.

According to the federation, fixed-term lecturers are being used increasingly in several universities as a matter of policy - to enable institutions to shed staff relatively easily in response to financial restrictions, and to avoid the long-term commitments associated with tenure.

The reasons this has occurred have to do with what has happened to universities and colleges over the past 20 years. Throughout the 1960s and well into the 1970s higher education boomed. But by 1979, the institutions were in a steady-state situation and now, disturbingly, find themselves facing a decline. One of the key difficulties is that because little

new blood is coming in, the salaries of those who do have tenured jobs cost the universities more each year.

This is known as "incremental creep" and has been described by Professor Peter Karmel - former chairman of the Tertiary Education Commission - as "a barding of the academic arteries". It is a problem likely to remain for a long time, for more than half of all full-time academics in universities are under 40 and four out of five are under 50. To work the older academics out of the system could take up to 15 years.

The Tertiary Education Commission estimates that incremental creep and other uncompensated cost increases take up an extra 5 per cent of the universities' budgets. But this was happening at a time when the previous Fraser government continued to hold expenditure on higher education at a static level and when staff salaries were costing universities and colleges more than 80 per cent of their income.

To save money, most universities stopped filling tutors' jobs and, in some cases, those of senior academics as well, as they became vacant and they are also appointing staff increasingly to temporary or limited-term positions.

The argument used to defend short-term posts is that they provide the universities with flexibility needed in a time of rapid change. According to Professor David Carr, chairman of the Australian Vice-Chancellors' Committee, and vice-chancellor of Melbourne University, short-term appointments mean a greater turnover of staff, making room for bright young graduates coming up behind. "We tend to listen to the arguments from people who already have jobs in universities, rather than from those outside looking in for work," he says.

But the secretary of the Federation of University Staff Associations, Mr Les Wallis, claims: "It is not so much flexibility, as cost-cutting that have led to the growth of fixed-term appointments. If, as in many universities, fixed-term appointees are not granted

superannuation, there is a 10 per cent saving for a start, Mr Wallis says.

No fixed-term employee stays around long enough to qualify for long-service leave, so this adds another 2 or 2½ per cent swag. And if a fixed term appointee is retrenched after three years to be replaced by someone else, the cost of incremental creep is minimized and the question of promotion never arises.

The federation says short-term appointments limit academic freedom. Without tenure, academics are less likely to speak out publicly, they may not speak out even within their own university or within their own discipline if they are in a minority.

The more serious argument against fixed-term positions, however, is that they prevent academics from initiating and following through long-term programmes. Academics say this leads to "Mickey Mouse" research projects - meaning short, simple, easy, say the critics, the fixed term teacher may not be employed long enough to develop his own course and an academic on a three-year appointment can hardly supervise a postgraduate student who may take five years to complete a higher degree.

Nearly everyone - from the senate committee, the Tertiary Commission and the vice chancellors to the academic staff associations - seems to agree that there are other options to relying solely on limited tenure for preventing hardening of the academic arteries. These include early retirement schemes, part-time permanent employment of senior staff, exchanges between government departments, industry and universities, and secondment of university staff to outside organizations.

But such proposals have been bandied around in higher education circles for five years, with the only real change being an increase in academics on short-term contracts. Says the staff federation: "The educational and research purposes of universities are ill-served by the policy of employing large numbers of fixed-term staff. The general pattern of employment of professionals in both the private and public sectors in Australia is based on an assumption of continuing employment. The university system of employing highly-qualified staff for a limited period, only to sack them and replace them with others, is most unusual within our society and quite contrary to the norms applied in other areas of the workforce."

Geoff Maslen

## Thomas A. Markus examines some issues behind the teaching of building design

Higher education in architecture is under stress. The University Grants Committee letter of July 1981 identified a possible mismatch between student numbers and graduate opportunity. One casualty was the Bristol University school which went down, after a brief struggle, apparently friendless within the university. Other schools have experienced this institutional isolation, a consequence of the way the discipline claims to straddle academic divisions - themselves a reflection of Cartesian fragmentation into disciplines; not surprisingly this claim is met with puzzlement if not resentment.

Beyond the obvious desires of government to economize on the number of students and schools and on the funding of one of the longest higher education courses (five years), followed by professional training which is non-funded, and the profession's desire to avoid over-manning, there are significant but less evident issues. To understand them a closer look is needed not only at the profession, but also at the object of its activity - architecture.

The most important attribute of architecture is that it carries meaning in at least three different ways. In the language made fashionable by French scholars, there are three discourses of architecture. Discourse is a useful word encompassing all evidence in a field of ideas - everything said, written or done ("doing" in architecture is designing and building). It also includes silence - those things which could be said, written or done, but are not.

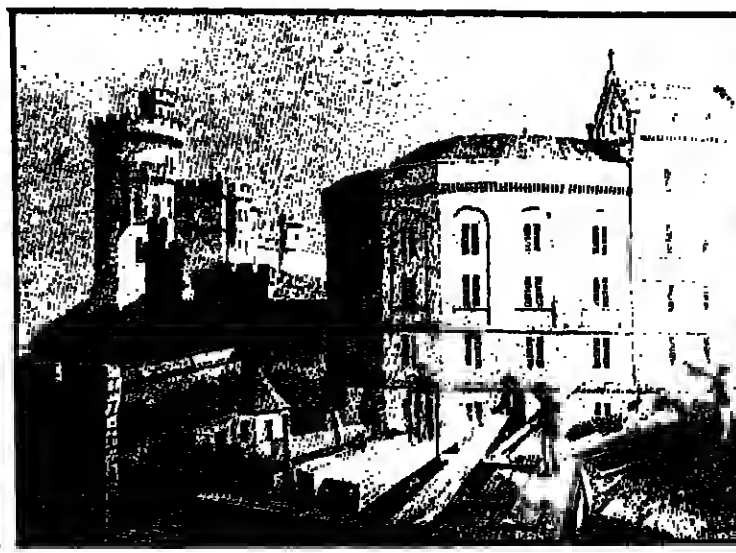
The first discourse in architecture is that of form - image, style, symbol or composition. This is the traditional home territory of architectural historians, theoreticians and critics and its methods are those of stylistic analysis and compositional geometry whether these are applied to the language of the classical orders or to that of post-modernism.

The second is that of function, which deals with the use and purpose of buildings. This is the spoken or written language in which the purpose is defined, sometimes by a similes, sometimes by an Act of Parliament (such as that defining the purpose of Edinburgh Bridewell Jail, in 1791, which was eventually built to Robert Adam's design based on principles derived from Jeremy Bentham's Panopticon) and today by means of a multi-volume brief for, say, a new hospital. Such documents use functional labels, they create silence by possible words, not stated, establish relationships between different parts of the statement and divide the brief into sets and subsets; all these form a conceptual structure, with meaning which is well beyond the common sense, apparently indisputable sense of the words and statements. The words "perjurer", "museum" or "hospital", and the classes of objects defined for the museum or of clinical specialities for the hospital, embody specific intentions about how a function is to be fulfilled.

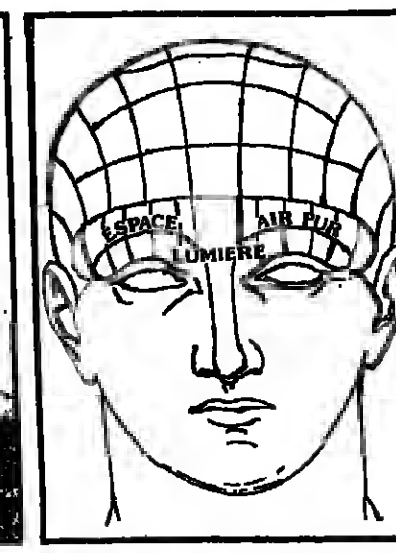
The third discourse, then, is that of space - considered as a pattern of interconnected elements. Almost 200 years ago Durand began to speak of space in this abstract way, in teaching compressed rules of composition to his students, the architects for the new empire, at the Ecole Polytechnique. Apart from Christopher Alexander's *Pattern Language* (1968) little was achieved until Bill Hillier and his colleagues at University College, London, started exploring spatiality as an explanatory level. Today their techniques are the most rigorous available.

Although experts' language in the three discourses is specialized and esoteric, the phenomena described are matters of daily experience, a stream of images, functions and spatial sequences. Moreover the three sets of phenomena are independent of each other: they are accustomed to a variety of styles and forms for museums or hospitals; a spatially "deep" building may be a bank or a hotel and both can have any form; a post-modernist building may have any function or spatial structure.

Further, the three attributes are not static. Not only may forms be altered over time, but our perceptions of them shift with changes in conscious-



A print by Shephard of the East End of Robert Adam's 1791 Bridewell Prison in Edinburgh, based on the principles of Bentham's Panopticon and a phenomenological drawing by Jean-Baptiste Andre Godin (1871) showing zones of space, light and fresh air in the brain, upon which he designed his industrial community at Guise, Northern France



## Architecture under stress

ness due to habit, associations or minor ways as well as major, when, for instance, we place a skating rink in a disused church. Spatial structures change as greater enclosure or more permeability is created: the disappearance of small alleys and streets to create megablocks in cities, the building of tunnels and bridges, the creation of dead-end streets or corridors which were previously through routes, are common examples.

Each of the three discourses yields meanings. To discover the global meaning of a building that of each separate attribute has first to be found - but in a common discourse. The only one which seems capable of dealing with such disparate phenomena is that of social relationships. These are not only those of everyday experience, analysed by social scientists, of self (or others) to self, which answer the questions "Who am I?", "Where am I going?", and "What am I becoming?", and those of self to other which are concerned with cosmic order, whether made evident by God or gods, reason, science, society or merely the wind in the willows. The discovery of the meaning of the three discourses in social relationships, at each of these three levels, can then be mapped back into the work of architecture, where they will combine in many ways. Sometimes there is a plurality of meanings; sometimes most curious and revealing conflicts, such as ecclesiastical Gothic facades for stock exchanges. Architecture, so understood, is part of the social process, and one of the mechanisms by which social relationships are structured.

These structures, when they frustrate relationships from self, others or (as Marx called the other) nature, result in the opposite of relationship, three types of alienation. Clearly, there is a contingent, inevitable relationship of these three attributes due to the materiality of the object and its production: it is impossible to produce a building, for a function, which has no spatial structure, or is without a form. But to attempt to relate the attributes to each other directly, by binding them together and calling this circumscribed field "architecture", without reference to society as a source for meanings, is to accept a materialism of the crudest kind.

The early modern "form follows function" dictum expressed precisely such an attempt, rejected when the heady hopes of architects' participation in the definition of functions for the new architecture were dashed and the acceptance of functions determined by others as being form-determining was recognized as obditiating the last remaining architectural freedom.

The enlightenment, the French revolution and the industrial revolution created a powerful new synthesis of the three discourses in a search for

greater order in towns and buildings. The proliferation of new building types serving the new society made possible the concrete achievement of ideas which apart from a few military, colonial or princely projects had previously been Utopian dreams. Institutions such as hospitals, prisons, asylums and workhouses, to create cities purified of physical, mental, moral and productive disorders, became realizable; so did industrial settlements such as Robert Owen's New Lanark and Titus Salt's Saltaire as well as vast housing projects committed to the integration of form, function and space in a search for discipline and order. Thus began that drive which came to fruition in the zoned and classified nineteenth-century city, the sanitary legislation, local authority housing and the garden city. The story has recently been explored in the context of Scottish enlightenment (*Order in Space and Society: Architectural Form and its Context in the Scottish Enlightenment*, Mainstream, Edinburgh), where much of Europe's intellectual and technological eagery was concentrated for a time. The effects of this zeal with us, following Garnier's and Corbusier's visionary cities degraded versions were built in the form of tower office and housing blocks, urban motorways and comprehensive development areas in every major city in the world. The totalitarian regimes of the 1930s used the ideas for their own purposes even to the ultimate purification project in Auschwitz with its "Arbeit macht Frei" triumphal entrance arch.

Once the Utopian ordering projects were absorbed into concrete practice on such a scale, and the three architectural discourses were developed to achieve new ends, parallel advances in the means had to be made. These were in technology - of two types - production and design. The inventions in cast and wrought iron, steel, concrete, glass, prefabrication, services and lifts were quickly appropriated by architects, from industry, and military and naval establishments. The pursuit of hygiene involved, after Chadwick's 1842 report, social engineering of fresh air, light and space, became the key motifs. Fowler's phenomenological disciples actually located these words in the brain; and the CIAM Athens charter of 1933 (uncannily) repeated them almost verbatim as the basis of modern architecture.

The shift in ends and means required a working agreement between designers and clients - the state, city institution or private developer. This agreement acquired the character of a pact which ran something like this: "We (the clients), the owners of the resources of land, labour and materials necessary for the implementation of any major planning or building project, intend our building activities to reproduce and reinforce the existing structures which, among other advantages, have enabled us to acquire those resources. We will give you (designers) almost unlimited

freedom to conduct the formal discourse (with some notable exceptions, as when we require the Houses of Parliament to be Gothic or Tudor). Your academics, schools, journals, books, history, exhibitions, criticism and debate will concentrate on this discourse. We will assist you by locating the definition of your activity in the field of fine arts (*beaux arts*) so that criticism of your products will be couched in language making them indistinguishable from large pieces of public sculpture. In this debate all your intellectual and critical energies are to be absorbed - if you wish you can, metaphorically at least, kill each other. "Further, the discourse of function will remain in our (the clients') hands. It will be explicit and structured as a 'technical', 'factual' or 'neutral' issue, for which purpose a panoply of building regulations, codes, official documents and "objective design methods" will be created to enable you to act as our agents. The discourse of space will be implicit - we will set no spatial objectives and you will exercise no spatial rights, but act as unconscious agents. Spatial structures will be the result of an osmotic process of precedent and convention, so that the existing and dominant spatial patterns will be reproduced. We will also make available such production and design technology as is required - and validate its use in the name of 'objective' rules. In return we (the clients) will give you legal guarantees of title, status, income and entry qualifications."

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made even more complete. The art and drawing content of courses diminished. But overall the changes were far from being merely an extension of the past - they released forces which have become formidable challenges to it.

What are a few of the differences between the old and the new systems? There was perhaps a diminution of practical skill, accompanied by more skill in environmental and energy matters. Perhaps a loss of artistic endeavour, and drawing ability, in favour of an increased social consciousness which has led the schools to pioneer the so-called community architecture movement. Some of the theory and history work has attempted to break out of the past by encompassing the functional and spatial critiques. But most has continued to underwrite it with its art-historical tradition, much strengthened by an influx of Germanic descriptive scholarship during the last war.

Andrew Saint, in a recent book (*The Images of the Architect*, Yale University Press) pleads for "a smaller architectural profession, in which imagination and artistic ability are more evenly balanced with technical and managerial experience... and in which 'sound building' is valued above 'high art'." In a recent review of that book (*New Statesman*, March 25) Stephen Mullins fully supports this view, and, in turn, advocates a transfer of control over architectural education to ARCUK, a reduction in student numbers, and a change from the "vague liberal arts" mish-mash to proper vocational training taught by good practitioners. These good practitioners, according to this critique are likely to be ones who became good in spite of both the pre and the post-1958 systems, not because of them. The replacement of art by good building, while it undermines a cornerstone of the past, replaces it with a technical issue, rather than bringing the other discourses into the open.

With two, perhaps more, critical factions even within the profession, the odds against the schools seem heavy, although the simple schools-versus-practice model cannot explain the politics of the situation. New alliances, between types of practice and types of school, are being, and will be, formed. If the outcome is a more balanced, accessible system, with a narrower and more traditional view, this may simply reflect the tragic truth that architecture, because of its resource requirements, and quite unlike any art form, is by definition the handmaid of a power structure, whatever its political colour. While the arts are free always to present radical challenges to power, paradoxically it is in maintenance of the fiction that architecture is another form of art that it has become emasculated and subservient. That is not to say that a new architecture would lack creative imagery.

The designers would have to exercise, in the formal dice game, a freedom to art even greater degree than in the past. Their work, superficially at least, may even look like much of the work produced under the past. It will certainly want to learn from the very best formal techniques, of Foster and others; use the most advanced but appropriate technology; the most powerful computing methods. But all these will be reshaped by new intentions, new responsibilities and matching new skills. Ultimately architecture's ability to subvert and transcend power structures depends on whether its practitioners receive any prophetic insights in their education. These insights would have to share some qualities with those of Blake or Piranesi who, in his *Carri* etchings, seemed to present that dark, paradoxical underworld (in spite of the name) as the architectural space to which the human spirit could grow and be free. This architecture and this spirit subverts the super order of the classical architecture in the bright light above ground and the society of Satanic mills which owned both it and its architects, just as his weeds overgrew, split and ruin the remains of the Roman order.

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John Irvine's and Ben Martin's recent study of the Isaac Newton Telescope (INT) at the Royal Greenwich Observatory (RGO) caused a considerable stir (THE February 18 and February 25). In it they have applied a set of statistical techniques and sought to assess whether a particular scientific institution has been operated successfully. But their contention is that methods such as theirs have a wider application. They believe that such studies could become essential in any planning of future installations in "big science".

The basis for this claim is that there is now only a limited number of independent groups operating in any one field of big science and that it is therefore becoming progressively more difficult to obtain unbiased opinions on the merits of any one operation or proposal. Perhaps there is an element of overstatement; there are always scientists who work on theory rather than experiment, or observation, and these theoreticians tend to be quite independent of the big laboratories and observatories.

Be that as it may, would it in fact be wise, or even possible, to make direct use of a study such as that by Irvine and Martin in laying plans for a great project, or in running an institution? Some quite general principles are addressed by this question, but it is best to be fairly specific.

The three major questions that arise quite naturally are:

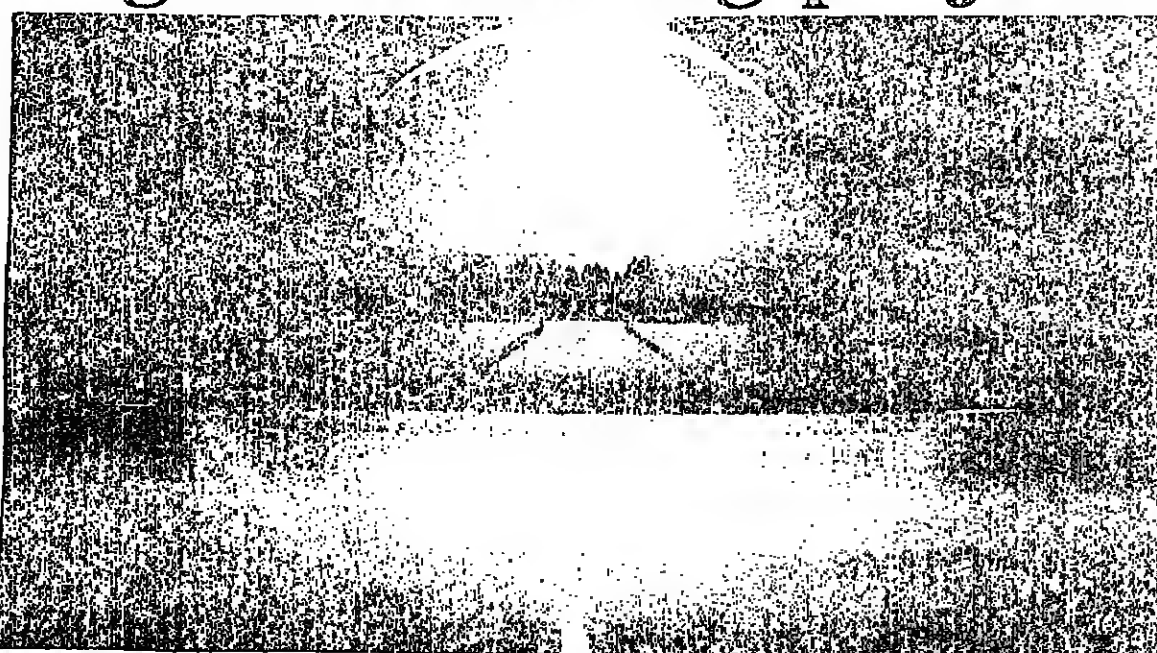
(i) As time passes there will be changes in the technical and political circumstances behind any project. How quickly should the managers of the project alter their plans in response?

(ii) A project may have been completed and have turned out less than perfect. What effect does this have on the way that the new apparatus is used?

(iii) Peer review is commonly used as one method of establishing a league table for the quality of different institutions, at some particular time. The positions in the league table are not fixed. How long are the results of such a survey valid?

The history of the INT serves quite well to illustrate the nature of questions (i) and (ii). The proposal to construct a large telescope for Britain goes back to 1946, a time when patriotic feelings were high but money was tight. There was a great deal of latent talent for astronomy which could not be exploited because of lack of access to telescopes.

## Big ideas for big projects



Etienne Louis Boullée's design for a Newton memorial. Would he have preferred the Herschmann telescope?

### F. D. Kahn comments on John Irvine and Ben Martin's controversial study of projects in astronomy

British weather was no different in 1946: air concerned realized that there are parts of the world with much clearer skies. Now it is routine for an observer to overcome this problem by flying, say, to Australia for his allocation of time on the Anglo-Australian telescope, and to be back at his post within three weeks. No jet planes were in service in 1946, and it would have seemed inconceivable that a telescope abroad should be built for use by observers based in Britain.

But by the time control of the INT had passed to the Science Research Council, and it was opened in 1967, such a mode of operation would have been accepted as quite feasible. At some time between the conception of the idea and the completion of the telescope there must have been a change in the nature of the best solution to the problem. At what stage should the organisers have responded? Clearly plans cannot be altered too frequently, or nothing gets done.

It is not only the improvement in transport that leads to changes in plans. It is equally important to respond to development in computer and control systems, in techniques of light detection (photographic plates versus solid state devices) and most important in the nature of the scientific researches that are to be carried out. The questions that are raised here are quite general: all these remarks can be formulated so as to apply to other branches of science.

Given then that an instrument has been built and is found to have limitations, what is the best course to adopt in using it, and what are the likely consequences? There were obvious drawbacks attached to the INT when it was sited at Herstmonceux in Sussex. The average number of nights with clear skies was much lower than at good sites overseas; further, since Herstmonceux is close to sea level, the atmosphere introduces far more disturbance, even when the sky is clear, than at a site

at high altitude. The result is a noticeable degradation in the optical images that can be obtained.

Faced with such limitations the directorate of an observatory has to recognize that there are whole classes of astronomical investigation which cannot be carried out competitively with the instrument. It is therefore forced to give emphasis to those branches of the subject where the effect is less drastic. But having thus restricted the operation it cannot then optimize the use of the telescope for timeliness and relevance of research with the same freedom that is available to other observatories at more favoured sites.

It is therefore not at all surprising that the observations which do get carried out are not world-shaking. This accords with the conclusion that Irvine and Martin draw from the statistics that they gathered from reading the Citation Index. The over-headers for a telescope, on the other hand, are not much affected by the

local climate. A telescope under a sky that is frequently cloudy will lead to a higher price, per paper published.

These, then, are the inevitable consequences of operating an instrument in an unsuitable climate. Another response is possible: take the telescope elsewhere. The decision to do so was taken some ten years ago. The instrument has now been installed on the island of La Palma in the Canaries.

Finally the value of peer assessment. Irvine and Martin quote results which produce a nearly definite pecking order. One has to agree that peer evaluation is a good way of establishing a league table, and naturally Irvine and Martin have used it in connection with other branches of science as well.

But the results have to be applied with care. The position of an institution in such an order of merit can be very strongly affected by events such as changes in staff and, even more, by the commissioning of new instruments. It would be interesting to discover whether Irvine and Martin obtain the same result if they repeat one of their surveys after an interval of five years, say.

On the other hand the well-informed insider will be able to spot trends far sooner than the impartial outsider. So one has to conclude that peer assessment has a value and the due weight must be given to the opinions held by people who actually understand the subject being examined.

What attitude should a scientist take to studies of this kind? Should he be up in arms in the face of the implied criticism, or should he be grateful to be offered some help in making decisions for the future? Neither reaction seems quite appropriate. The allocation of funds for scientific purposes, and the consequences of such actions, are a legitimate field of study for members of a Science Policy Research Unit.

If they can draw valid inferences from a particular set of experiences, so much the better. But there are deeper truths underlying the simple conclusions that one can reach via a statistical analysis. As they stand, the results they have reached are interesting, but they could become considerably more so with a more thorough interpretation.

The author is professor of astronomy at the University of Manchester.

N. W. Tanner and J. S. G. refute accusations that Oxford admissions reflect social bias

## Is there a touch of class bias?

There is an ancient and honourable tradition of condemning Oxford for being socially elitist. Most recently it has been Philip Whitehead's Labour Party committee on post-18 education complaining about the unreasonable proportion of undergraduates from private schools and threatening Oxford with quotas imposed by legislation. Before that it was Neil Kinnock, MP, describing Oxford as a "major cancer in the educational system". But we can go back to the sixteenth century and find in a sermon of Bishop Hugh Latimer the words:

"He [the Devil] get him to the universities, and causeth great men and esquires to send their sons thither, and put out poor scholars that should be divines."

Mr Whitehead and Mr Kinnock might like to remember that Bishop Latimer was eventually burnt in Oxford, although possibly for theological and political rather than educational heresies. In fact there is not much defence for the past: the Public Orator of Oxford for 1768 recorded the reasons for the expulsion of several undergraduates among them "James Matthews - accused that he was brought up to the trade of a weaver - that he kept a taphouse - confessed". Oxford is certainly more tolerant today but there are still precious few sons of publicans or daughters of weavers among the undergraduates of Oxford, or at least so it is believed. Curiously Oxford is the only university in the country which makes its decisions on admissions without any knowledge of parental occupation.

The substantial accusation is that the proportion of Oxford undergraduates from independent schools is at 52 per cent too big and reflects a social bias rather than an academic selection. Independent schools account for only 6 per cent of secondary education but this distills into 16 per cent of the sixth forms, and 29 per cent of undergraduates nationally.

Is there really a social bias, or is Oxford merely a further stage in the ability distillation process which will eventually deliver captains of industry, and dons, and even members of parliament? Is 52 per cent, declining at less than 1 per cent per annum, an unreasonable proportion of undergraduates from independent schools?

Much concern has been expressed in Oxford about the difference of the success rates for applicants from maintained and independent schools.

Apparently maintained school pupils have only one chance in three of getting a place whereas their competitors from independent schools have nearer one chance in two. In fact the difference is meaningless. Most independent schools present their candidates after A levels and the weaker potential candidates withdraw because of poor A level grades and consequently make less successful back bids. If there is any inference to be drawn from success rates it would concern the large increase in the number of maintained schools which have been persuaded that it is reasonable to enter some of their pupils in the Oxford competition.

A much more substantial criticism can be made that selection for Oxford is by achievement, rather than potential, thus conferring an advantage on those schools which are particularly skilful at preparing their pupils for examinations.

It is very difficult to believe that there is any significant bias among Oxford tutors in favour of independent schools (despite the odd few spectacular examples to the contrary "justified" by the prospect of a benefaction or the educational needs of a future ruler). But there is a reason to suspect that selection is more by achievement, which is what examinations are about, than by promise.

It is not easy to spot untrained talent, particularly when the view is obscured by examination marks, but all is revealed (in some sense) three or four years later when the final class lists are published. In between, the undergraduates from about 2,100 different schools have been jumbled up in 28 different colleges, variously suffered and enjoyed common tutorials and lectures, and written examination papers for the examiners who have not the slightest idea of the social or educational origins of their examinees.

Only when the class lists are published in the newspapers is the name of the old school attached to the name of an undergraduate. Sifting these class lists and identifying schools gives the number of first, second and third classes obtained by the ex-pupils of maintained and independent schools separately, as in table 1. Undergraduates from overseas and other universities and those who did not record an old school have been excluded from the tables, but in total there were only 109 such.

The big differences are in the percentages in the first class. Men from maintained schools win the competition comfortably, whereas the



Oxford: Is the strawberries and champagne image fair?

women from the same schools lose horribly. There is very little chance indeed that the differences are just a statistical fluke.

About a third of all women are in the three remaining women-only colleges, but that does not explain the low percentage of first classes. Women in mixed and single sex colleges score almost exactly the same proportion of firsts. On the other hand the women's colleges collect rather more than their fair share of third classes (nearly 12 per cent) and it looks as if they are dipping too deep into the pool of talent in their efforts to fill their places. If the women's colleges are excluded from the statistics then all four groups score a nearly uniform 10 per cent thirds. A fixed percentage of thirds and a variable percentage of firsts could mean that the final examiners are distributing the thirds at random, but it is more likely that undergraduates fall by the wayside for other reasons than incompetence.

There are quite big differences between the popularity of the various subjects between men and women and, more surprisingly, between independent and maintained schools. Why are the applied sciences, engineering and medicine, populated 60-60 in favour of independent schools whereas the big pure sciences, physics and chemistry, are 60-40 in favour of maintained schools?

And why is the balance the other way round for the "applied" arts of Law and Politics, Philosophy and Economics and the "pure" arts of English and history?

Independent of the balance between type of school or men and women we observe that in nearly all subjects the men from maintained schools do well and the women from the same schools relatively badly. Engineering does not count as there are too few women rendering the subject. It seems unsurprising that men generally obtain better results than women in the sciences and PPE, and that the reverse occurs for English, but the breakdown by subjects provides no hint of an explanation for the differences associated with the type of school.

For many colleges, 1982 was the first year in which their women undergraduates reached the stage of finals, and the proportion of men and women in colleges is highly variable and probably nowhere near the equilibrium that will be achieved in a few years time. It also follows that the proportions of independent to maintained schools may also change depending on what applications the college receives. It is worth adding that the proportions of men/women and independent/maintained for any one college reflect quite accurately the proportions of the applications received. There is no evidence at all

that any college exercises a bias in favour of undergraduates of a particular origin, but it is quite clear that undergraduates of a particular origin exercise a bias in favour of certain colleges.

Allowing for the statistical fluctuations, which always occur with small numbers, there is no correlation of any one college or group of colleges with the relative success of men and women or maintained and independent schools in finals. There are big differences between the proportions of first and thirds obtained at the various colleges but that is a matter of the Nottingham league table and has no obvious connection with any social bias.

It is notoriously difficult to draw firm conclusions from statistical evidence, but those who are familiar with standard deviations and chi-squared tests will certainly agree that the men from maintained schools do well, the women from maintained schools do badly, and the men and women from independent schools break even. They might further agree that there is no evident correlation with subjects of study or colleges, except perhaps the small excess of thirds at the women's colleges.

Now if we suppose that the sole object of selection by dons is to secure the best results in Oxford finals and that 10 per cent of the irreducible thirds is unrecognition at the time of admission, then the following changes would occur: men from maintained schools would increase by 37 per cent; men from independent schools would decrease by 2 per cent; women from maintained schools would decrease by 49 per cent; women from independent schools would decrease by 11 per cent. This will give proportions of men/women of 77/23 and independent/maintained of 50/50, which is likely to offend against the Sex Discrimination Act and will certainly not satisfy Mr Whitehead's committee.

The false assumption hidden behind this dubious logic is that the pattern of applications to Oxford remains unchanged from year to year. The freshers who came up in October 1982 have a proportion independent/maintained of 49/51 compared to 52/48 for the finalists 1982 who came up in 1978 or 1979. Almost of more able pupils at maintained schools being willing to have a go at Oxford. It is thought that the reluctance to try now stems not so much from the schools themselves but from the pupils who feel that they may not be very comfortable in the mythological social scene portrayed by *Brideshead Revisited*. The Labour Party committee might like to give a thought to the way in which they might persuade pupils at maintained schools that the places at Oxford are there for the taking, rather than threatening quotas.

The authors are the minor for admissions at Hertford College, Oxford, and his son, an undergraduate at the University of Durham. Durham University's help with computing facilities is gratefully acknowledged.

## Gandhi as the prophet of Indian social education

When the Calcutta University Commission had completed its investigations in 1919, its chairman, Michael Sadler, before the official report was published, gave a private address to the senate of Bombay University. He spoke of *The Educational Movement in India and Britain*, identifying three principal areas which called for urgent attention - refining education; improvements in higher secondary education; teachers, their preparation and control.

He expressed strong doubts as to whether a European model would fit Indian conditions and he concluded: "If you want social dynamite, modern elementary education of the customary kind will give it to you. It is the agency which will put the masses in motion. But to what issue no one can foretell."

If fell to Mohandas K. Gandhi to be the prophet who foresaw where the problem of vast illiteracy had to be tackled. He realized that it was by an awakening and reorientation of the adult mind that society could be organized in new directions. It was, accordingly, wholly appropriate that the term social education was substituted by the government of India for adult education. The term is more comprehensive than what has generally been understood in England by adult education. It implies what the Gandhi-inspired report of the Basic National Education Committee speaks of as "the literacy of the whole personality".

Foreseen in Gandhi's idealism is an India that as an enlightened democracy will play its part in the arena of world politics, both as a peace-maker and as a champion of the cause of oppressed peoples. To achieve these aims it would be necessary for the tens of millions to be turned into a sufficiently educated

In the wake of the excitement and the furore caused by Attenborough's *Gandhi*, J. H. Higginson looks at Gandhi's impact in the field of learning

electorate, so that they could take part in solving the problems facing India, not least when independence would be achieved.

In 1915 when Gandhi returned from South Africa he had behind him the vitalizing experience of his crusade against the doctrine of racial superiority. He found an India of apathy and downtrodden masses in which even the leaders of the various parties looked more to the imperial rulers for deliverance than to the people. He began the uphill struggle to create a consciousness of unity among the Indian people.

The task which confronted him has been likened to a conflict between the broad vision of a prophet and the sectional activities of a politician. Gandhi combined both attributes in his writings, preachings and personal example. He brought the kindling torch of knowledge in the remotest areas, awakening his countrymen from their frustration to an awareness of rights and responsibilities. From the teaching of his Ashram in India to the large masses of villages he gave the inspiration of a new social order.

The Quit India Movement launched by the Indian National Congress in August 1942, under the leadership of Gandhi, stirred the entire nation. Gandhi came out of gaol with a new conception of the basic education scheme known as Nai Talim. One of his first pronouncements after his release was: "I have,

been thinking hard during the detention period over the possibilities of Nai Talim. . . . We must not rest content with our present achievements. We must participate in the homes of the children. We must educate their parents."

Through his talks and writings he tried to explain this concept of Nai Talim as education for life through life because: "It has become clear to me that the scope of basic education has to be extended. It should include the education of everybody at every stage of life."

Not long before his death Gandhi described in detail how his concept of Nai Talim had grown in depth from the time when basic education put such an emphasis on education through crafts. He said that: "This true education must be easily available to everyone. It is not meant for a few lakhs of city people but must be within easy reach of millions of villagers. This education cannot be given through the dry leaves of books. It can only be given through the book of life. It can have nothing to do with the teaching of sectarian dogmas or ritual. It teaches the universal truths common to all religions."

Gandhi's historic march to Dandi was one of the most significant experiments in mass education. It awakened the whole country to a sense of duty. He directed the students to devote their vacations to village service. He expected them to stay in the villages and conduct classes for adults. They were to teach the rules of sanitation.

In Gandhi's view the dynamic for change was the peasantry, the tillers of the soil who produce the food. Hence he concentrated on bringing about the material and intellectual improvement of the rural population.



He considered that industrial cities had grown to meaningless dimensions in the apparatus of money and machines. Through a widespread education of adults he sought to pass on his vision of a non-violent socio-economic order as a legacy from generation to generation.

As the conflicting assessments stimulated by the Attenborough film show, Gandhi's was a complex character. When Lord Mountbatten addressed the Royal Empire Society in London on October 6, 1948 he said that Gandhi in India: "was not compared with some great statesmen like Roosevelt or Churchill. They classified him simply in their minds with Mohammed and with Christ."

Earlier, in India itself, speaking at the All-India Education Conference in December 1947, a distinguished Indian, K. G. Saikrishnan had told his audience that Gandhi was the great

worker in the cause of the social education of adults that the world had ever known. He added: "Where men of lesser calibre have been swept away by mass hysteria, he stood firm and courted abuse and unpopularity and misunderstanding by speaking the truth. From the educational point of view, what Gandhi has done during the last few months outweighed all the manifold achievements of his entire life."

In his recognition of the Mahatma's outstanding impact on social education Mr Saikrishnan little dreamt that within weeks of his appreciation, Gandhi's crusade to save India and Pakistan from an orgy of blood and destruction would result in his death by the hand of an assassin on January 30, 1948.

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TABLE 1

Class	No. of undergraduates	% in each class				All
		Men	Women	Men	Women	
I	335	12.4	17.6	11.5	7.0	12.8
II	2008	78.7	72.5	78.8	81.8	76.7
III	278	10.9	8.9	9.9	11.2	10.5
Total	2818	100.0	100.0	100.0	100.0	100.0

TABLE 2  
Performance in finals by subjects

Subject	No. of Candidates	Men	Women	First classes %			
				Men	Women	Men	Women
Biological sciences	187	58/44	49/51	10	18	13	10
Chemistry and biochemistry	209	76/24	41/59	18	17	11	3
Engineering and metallurgy	134	90/10	61/39	14	22	0	17
Mathematics	170	72/28	48/52	15	19	0	8
Medicine	97	57/43	62/38	11	25	12	0
Physics	170	82/18	39/61	17	21	8	12
All sciences and mathematics	967	72.8/27.4	48.3/51.7	14.7	19.5	8.4	7.5
Classics	110	69/31	71/29	21	33	29	6
English	264	50/50	58/42	7	11	13	11
Geography	88	67/33	57/43	6	7	6	0
History	327	65/35	59/41	12	14	7	5
Languages	294	81/39	54/46	15	21	17	8
Law	225	86/34	48/52	7	9	11	6
Music	48	48/52	46/54	8	9	20	7
Politics, Philosophy and economics	244	75/25	48/52	8	18	9	0
Theology	52	71/28	40/60	8	28	20	10
All arts	1652	63.6/36.4	54.7/45.3	11.1	16.0	12.8	8.7
All subjects	2818	66.9/33.1	52.3/47.7	12.4	17.6	11.5	7.0

TABLE 3  
Performance in finals by colleges

College	No. of undergraduates	% Man/Woman		% Ind/Maint	% First classes				Men & Woman Ind. & Maint.		Nourington score
		Men	Women		Ind.	Maint.	Ind.	Maint.	% I	% II	
University	96	78/22	53/47	28	25	25	0	22	8	+16	
St Catherine's	118	89/31	42/58	9	25	20	10	17	6	+11	
Wadham	94	86/34	45/55	16	18	24	0	15	4	+11	
Hertford	84	64/36	28/74	13	20	22	0	14	5	+9	
New	114	82/18	68/32	20	21	22	25	21	12	+9	
Oriel	77	100/0	64/36	14	25	0	0	18	9	+8	
Balioi	102	81/18	60/40	20	24	18	13	21	13	+8	
St John's	86	81/19	56/44	13	26	11	14	17	9	+8	
Orasenosa	98	64/38	54/46	24	21	11	0	18	9	+7	
Jesus	82	51/49	35/65	13	12	23	7	12	5	+4	
Worcester	86	77/23	68/34	14	16	0	17	14	10	+4	
Lincoln	71	73/27	54/46	19	19	0	0	14	11	+3	
Queen's	81	86/14	54/46	10	21	0	0	12	8	+3	
Keele	108	84/16	55/45	10	23	13	0	14	12	+2	
Lady Margaret Hall	101	33/67	53/47	0	17	12	14	11	8	+2	
St Hilda's	101	81/20	50/50	0	15	6	13	11	+2		
Pembroke	87	82/18	54/46	8	15	0	22	11	11	+2	
Trinity	73	85/15	56/44	11	12	20	0	11	11	0	
Somerville	98	0/100	50/50	0	8	14	11	12	-1		
Corpus Christi	46	78/21	44/56	7	16	0	0	8	11	-2	
Halls etc.	57	88/12	51/49	0	17	0	25	8	11	-2	
St Edmund Hall	97	85/15	56/44	13	11	0	0	10	12	-2	
Exeter	84	83/17	55/45	5	11	25	0	7	10	-3	
Merton	63	100/0	51/49	9	13	0	0	11	14	-3	
St Peter's	84	86/14	44/56	3	8	0	0	5	8	-3	
Magdalen	82	89/11	59/41	12	10	0	13	11	15	-4	
Christ Church	112	87/25	62/38	8	17	0	0	10	18	-6	
St Anne's	119	29/71	42/58	8	8	5	4	6	15	-8	
St Hugh's	93	0/100	51/49	0	7	6	2	4	13	-9	



# Where now for American political science?

James Manor looks at the aftermath of a trouble decade

Over the last decade or so, the study of politics in American universities has changed, not by all means recognition, but quite substantially. The old dominance of pluralists and behaviouralists has been greatly eroded. New and, by American standards, somewhat exotic topics and modes of inquiry have gained ground. The prevailing mood is one of uneasiness and a lack of collective cohesion, tempered by hope of renewal and a sense of being in transit to destinations that are as yet unknown.

The new trends are partly the result of changes which are external to the profession, changes in the American and international political scenes. The nation's domestic troubles have had a particularly powerful impact. Most political scientists appear to feel at least a mild anxiety at the state of the country and a sizable minority foresee an early "crisis of regime" akin to those of the 1840s or the 1930s.

Many things fuel their fears. The severity of the recession in recent years in the older industrial centres of the northeast and midwest has compounded the already appalling problems of long-term economic decline and the maintenance of the social fabric there. The dispersal of power and resources within the existing federal structure seems certain to thwart those who seek a spirited attack on the crisis of decaying cities, yet there is no realistic prospect of altering that structure.

The major party organizations have wasted away in television, opinion polls and direct mail techniques increasingly perform - often perversely - their former tasks. Parties have become well nigh incapable of forging broad coalitions by arranging bargains between varied interests. It is therefore easier for single-issue pressure groups - campaigners, as one was put it, for "unborn gay whales", or often for powerful corporate lobbies - to inflame and oversimplify public discussion, and divert attention from fundamental problems.

Politicians' heavy use of television advertising at election time has increased their dependence on money, and has led to the ludicrous trivialization of political debate.

Political analysts who are worried because a simple-minded, telegenic smoothie now occupies the White

House are patently alarmed about a likely further devaluation of political debate producing none of the same, or worse. Deep popular anxiety over economic troubles, social disintegration and the decline of American power in the world has created major opportunities for stylishly televised demagoguery. This has been something of a growth industry among purveyors of religion in recent years and it seems only a matter of time until politicians get in on the act.

All of this has left many scholars shaken. There was a time when political scientists and historians in the United States tended to treat the American case as unique and inspirational. This sort of fervour was central to much of the writing of, for example, Henry Steele Cantrill, and even the figures of the stature of Carl Becker occasionally succumbed to this idiom. Today, serious scholars are apt to be much more cautious and critical in their judgments.

Events in the international arena have also generated challenges to old verities. The world no longer seems so tidy, predictable, encompassable, comprehensible as it once did. Few now share the old confidence that other societies and polities will gradually become more "modern", secularized, pluralist, prosperous, rational and liberal - that is, more like America was once seen to be. That and other notions of "progress" seemed plausible in the boom years of the late 1950s and the early 1960s, when the vivid memory of the Marshall Plan and the recovery of Europe provided a metaphor for what was to come.

In the wake of events in Iran and elsewhere, the process of "modernization" now seems as likely to frighten and deracinate people as to make them more rational. As a result, political scientists are moving into fields which for a long time were largely ignored. One of these is the study of religion.

In the great days of liberal optimism, religion was often regarded as something close to "superstition" which would be burned away by the forces of modernity and secularization. Scholars who studied religion and politics were seen to be eccentric, wasting their time on what was by now soon to be an anachronism. The professor was therefore unable either to anticipate or to explain the Iranian revolution.

It is said that when it occurred, even the Central Intelligence Agency (CIA), which had long imbibed the assumptions of American political

science, found that it had not a single religion specialist to make sense of the Islamic revival. In recent years, there has been a major surge in the study of religion and politics thanks not only to the Ayatollah but to events in Poland, the transformation of the role of the church in Latin America and the huge growth of cults - Christian and otherwise - in the US.

Perhaps the most remarkable change in recent years has been the surprisingly widespread loss of confidence in behaviourism, which once enjoyed pre-eminence in and lent cohesion to the profession. To say this is not to claim that behaviourism now feels that their methods yield dubious results. Their faith in their techniques and in what must of them still call "scientific rigour" remains largely undiminished.

What has evaporated is the belief that by understanding political behaviour, we can learn nearly everything that we need to know about politics.

In their heyday, behaviourists in political science departments actually led sociologists, economists and others on the great trek away from studies of the role of the state in human affairs.

Times have changed. From one end of the ideological spectrum to the other, people have realized that the state plays a major role in politics and other spheres of life. I was told repeatedly that the state is "an ideological construct worthy of study", that it is "an entity possessed of a logic and a set of imperatives of its own", that "we need to know what people perceive and expect the state to be". All of this may be old news in most British politics departments, but in America these days it is often proclaimed as new. Scholars are dusting off books by political philosophers who deal with the state, so that "political theory" once again means more than social and behavioural theory.

These discoveries are impelling American political scientists into a whole range of interdisciplinary work. What is the relationship between the state and cultural pluralism, the state and market forces, the state and social change? What interplay of state structures and socioeconomic forces cause democratic regimes to break down in Latin America, survive in India, emerge in Spain or fail to emerge in much of capitalist east and southeast Asia?

Questions of this kind have captured the imagination not just of

many political scientists, but of those in the claret of the establishment itself. The American Social Science Research Council, as Theda Skocpol's long essay on "Bringing the State Back In" indicated in last June's issue of the council's bulletin. If behaviourism has been de-throned, no new school of thought has yet replaced it. The lack of focus which has been greeted with mixed feelings. A single conversation can yield, on the one hand, mournful comments about "losing our way" as the profession fragments into a bewildering array of poorly integrated sub-fields and, on the other, expressions of excitement with "this time of ferment" and the "wide open nature of the field".

A clearer understanding of this situation may emerge from a close look at a lament which cropped up occasionally in talks with senior professors. They tend to bemoan the fact that the profession now seems incapable of producing younger scholars of genuinely startling brilliance. As they look round, they are unable to locate present-day counterparts of Robert Dahl or Seymour Martin Lipset who were so conspicuous in their thirties. This is not just the grumbling of ingenuous old men. Conversations with younger scholars produced plenty of forceful statements of this generalization and abundant nominations of young geniuses to disprove it, but not the faintest consensus on whom the new stars were.

There are good reasons for this. To establish one's self as a young (or indeed a middle aged) giant, it is necessary to present new views which have wide-ranging implications. That is only possible if one is first able to synthesize ideas from a broad array of sub-fields, and it is precisely this that has lately become more or less impossible.

The dispersal of American political scientists into so many new and not-so-new specialisms, and the highly specialized character of most post-graduate programmes naturally discourages would-be synthesizers. They fear that attempts to write books of broad relevance may attract severe reviews from specialists whose sub-fields they have failed to master. It is far more difficult today than 10 or 15 years ago to write a book which everyone will feel they must read.

To discuss such books in America today is again to encounter emotional cross-currents. There is a good deal of nostalgia among both older and younger scholars for the days when challenging works on general

themes appeared quite often. But many of the same people also display a certain distaste for the authors of such books. They regard grand synthesizers as over-hasty entrepreneurs who tried to "get rich quick", as mere "essayists" who lacked rigour and an adequate grounding in a specialization or in empirical research.

The trend today is towards a scaling down of the ambition to invent grand concepts. Even those who still seek to generalize now feel compelled to anchor their assertions in one or a small number of case studies. And yet despite all of this, nearly every conversation eventually swings back round to the need for new paradigms, new meta-systemic theories to help scholars to gauge the importance of their specialized studies and to make sense of what many see as a systemic crisis in American politics.

One important development among a minority in recent years, which is a response both to the need for synthesis and to the sense of impending crisis in America, is the growing popularity of Marxist modes of analysis. The nation's dilemmas have impelled scholars from a wide range of disciplines to seek radical alternatives to established theories. Many have swung to the right, to the so-called "neo-conservatism" of the Irving Kristols and Jenne Kirkpatrick. But those turning left appear to have found a richer and more coherent body of thought awaiting them.

Dissatisfaction with what is seen as the failure of pluralist and structural-functionalists to deal adequately with inequality, exploitation, class formation and change over time has grown significantly in recent years. Things which were once taken as given, such as the nature of the state and its relationship to society, are now widely seen as problematic. The growth of specialization, the increasingly disparate character of the profession and the sense of systemic crisis have all made Marxist analysis more attractive since it asks the kind of macro-systemic questions which now seem called for.

This shows no sign of becoming the view of the majority, which remains liberal-to-centrist. Statements such as Charles E. Lindbloom's 1982 essay in the *American Political Science Review* are still regarded as somewhat eccentric by most political scientists in the more renowned departments. And the excruciating pressure of the race for tenure tend to check the leftward trend among younger people.

In respectable institutions, this is the result not of latter-day McCarthyism but of a refusal by many senior academics to accept the Marxist tradition as a sufficiently rich mode of analysis.

The baleful influence of the tenure system, which made sense in more affluent times but which has grown increasingly poisonous as funds and permanent appointments have dried up, is evident in many other ways.

Many untalented political scientists seek to insure against unemployment by turning to marketable topics of study. Public policy, management techniques and the politics of energy or high technology are very hot at the moment. Projects related to business, defence and national security are particularly fundable under the present administration. Some of these efforts generate useful insights into the workings of political systems, especially in the field of political economy. But a great many turn out to be tedious exercises tailored to the uninspiring demands of the "market" (real or imagined) or to the specifications of government contracts.

In sum, then, American political science today is less confident and cohesive than it was. It faces severe problems in rearing up the next generation of scholars and in formulating ideas that might help the nation to cope with multiple vexations and to renew itself. But the profession is also more open-minded, interesting, creative and perhaps more realistic than it has been for a very long time.

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## BOOKS

### Love under the palm trees

by Adam Kuper

Margaret Mead and Samoa: the making and unmaking of an anthropological myth by Derek Freeman  
Harvard University Press, £11.95  
ISBN 0 674 54830 2

Anthropologists are always slanging one another - they are quite as bad as literary critics - but few have enjoyed such public attention as Professor Freeman has received for his critique of Margaret Mead. There is a perceptible element of *schadenfreude* about much of the press commentary, and Professor Freeman's critique is rough and uncharitable even by anthropological standards. But then, in his view, great issues are at stake, and so the gloves are off.

Margaret Mead went to Samoa in 1925, at the age of 23. Slightly built and looking even younger than her years, she "had never been abroad or on a ship, had never spoken a foreign language or stayed in a hotel by herself. In fact, I had never spent a day in my life alone". Her formal preparation was minimal. "I had a half hour's instruction in which Professor Boas told me that I must be willing to seem to waste time just sitting about and listening."

Yet she was not wholly unprepared. She had completed a thesis on Polynesian cultures, based on secondary sources, and she had absorbed a point of view about culture from Boas. If there was "no how" in our education", as she said, she had learned "what to look for". Professor Freeman believes that Margaret Mead was only too aware of what she had to look for. She was, in his view, sent out to find an illustration of a theoretical proposition, and this commitment biased her observations.

The first part of Professor Freeman's book sketches the confrontation between the eugenics movement and Boasian anthropologists in America, which came to a head at about the time Margaret Mead went into the field. Together with many psychologists, Boas and his students were emphasizing the independence of mental processes, the distinct characteristics of what Kroeber termed "the superorganic". In 1924 Boas said that the problem was to differentiate "between what is inherent in bodily structure, and what is acquired by the cultural medium in which each individual is set". He called for "a scientific and detailed investigation of heredity and environmental conditions". Freeman comments that: "Within a few months he had planned just such an investigation, and had found in the 23-year-old Margaret Mead the very person to carry it out."

But it was not so simple. Margaret Mead has explained that Boas was reluctant to allow her to work outside the United States. He agreed that she could go to Samoa only on condition that she studied adolescent girls, because that was likely to be a safe and relatively easy group for an inexperienced young woman to work with. Margaret Mead accepted, in part, because she believed that too little work had been done on the point of view of women and girls in "primitive societies". In her autobiography she cited a letter Boas wrote to her when she went into the field, which certainly does not bear out Professor Freeman's contention that she was sent to perform the crucial experiment in the nature/nurture controversy. "One question that interests me very much is how the young girls react to the restraints of custom," Boas wrote. He pointed out that in America the adolescent was often rebellious or sullenly submissive, and suggested that these attitudes expressed a frustrated desire for independence. "I am not at all clear in my mind in how far similar conditions may occur in primitive society and in how far the desire for independence may be simply due to our modern conditions and to a more strongly developed individualism."

"Stick to individual and pattern problems", he urged. Not a word here about biology or about experiments, and Mead's results are in no way foreshadowed on these propositions. It is true that in the introduction to her popular book she did claim that it represented a crucial experiment in the nature/nurture debate, but there is no evidence that she really thought of her study in this way from the start.

However, when she arrived in Samoa Margaret Mead appeared to be as susceptible to accident as any of us. The boat carrying her grant cheque was six weeks late, so that she could not leave the hotel. It was two months before she got into the field properly, rather casually choosing the Manu islands. "Everyone agreed that the Manu islands were much more old-fashioned and were, therefore, much better for my purposes."

In Manu's she chose to live in the American naval dispensary, writing to Boas that she had decided not to live with a Samoan family because of "the loss of efficiency due to the food and the nerve-racking conditions of living with half a dozen people in the same room in a house without walls, always sitting on the floor and sleeping in the constant expectation of having a pig or a chicken thrust itself upon one's notice". This was certainly a choice which Melinowski's students would have reversed, but in her autobiography she pointed out some real advantages. "Living in the dispensary, I could do things that otherwise would have been wholly inappropriate. The adolescent girls, and later the smaller girls whom I found I had also to study, came and filled my screen-room day after day and night after night..." Her letters home reflected doubts rather than programmed certainties. "The truth was that I had no idea whether I was using the right methods. What were the right methods? There were no precedents to fall back on."

Her time on the Manu island of Tau was devoted to the study of fifty girls, and it was concentrated on a period of four months, interrupted by the hurricane and by school term. This provided the material for *Coming of Age in Samoa*, which was published in 1928 and became one of the bestsellers of the generation. But Margaret Mead spent nine months in all in Samoa, and while this was a short time by anthropological standards she also managed (despite her brief from Boas) to collect more general ethnographic information, mainly on other islands, and in 1930 her sober *Social Organization of Manu'a* was published by the Bishop Museum in Hawaii. It attracted the attention only of specialists.

*Coming of Age in Samoa* therefore represents only a very small part of the results of a brief, interrupted, apprenticeship study, made by an inexperienced young woman in the pioneering days of field anthropology. Moreover, the book itself - in contrast to her 1930 monograph - was aimed at a popular market. It is a short book; nearly a quarter of it is devoted not to Samoa at all but to the problems of education in the United States. This is the study which Professor Freeman regards as important enough to warrant a solid volume of criticism more than half a century later. His substantive criticism is in fact addressed to chapters three to twelve of *Coming of Age*, in which Margaret Mead describes the life cycle of Samoan women.

Margaret Mead concluded that Samoan women moved easily from childhood through adolescence to adulthood without suffering difficult adjustments and strains. In Samoa "adolescence represented no period of crisis or stress, but was instead an orderly developing of a set of slowly maturing interests and activities. The girls' minds were perplexed by no cultural queries, troubled by no philosophical problems, beset by no remote ambitions. To live as a girl with many lovers as long as possible, and then to a more strongly developed

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Margaret Mead in Samoan dress

to marry in one's own village, near one's own relatives, and to have many children, these were uniform and satisfying ambitions."

The final two chapters of her book drew the moral for America. The disturbed adolescence typical of America was due to sexual inhibition, to "the evils inherent in the too intimate family organisation", and above all, to the fact that the American child was confronted with a bewildering variety of choices - between religions, political loyalties, moral standards, and career possibilities. Americans should therefore encourage tolerant sexual attitudes, loosen the grip of the nuclear family, and design an educational system which would equip a young person to make rational choices. It was without any question this moral which earned the book its popularity, and from the first Margaret Mead was at least as interested in the "applied" side of her work as in its theoretical significance. "I have spent most of my life studying the lives of other peoples, faraway peoples", she wrote in her autobiography, "so that Americans might better understand themselves."

Professor Freeman is concerned to demolish Margaret Mead's "negative instance", her claim that in Samoa adolescents were untroubled by their developing sexual maturity. This has not been the work of a day for Professor Freeman. He first did field work in Western Samoa in 1940, staying for two years and discovering that at least in his part of Samoa, things were not as she had described them. "By the time I left Samoa in November 1943 I knew that I would one day face the responsibility of writing a refutation of Mead's Samoan findings." He subsequently carried out archival research, and after taking up a post at Canberra in the

1960s, he regularly revisited Samoa to build up his case. He did not regard his research as complete until he could study the archives of the American courts of Samoa for the 1920s, and so, alas, he could release his book only after Mead's death, in 1978. He says, however, that he told Mead the basis of his criticism in 1964, but does not record her answer.

The first part of Freeman's critique deals with Mead's general picture of Samoa (or at least Manu'a) as a tolerant, relaxed, flexible, traditional society. But since it is the nature of adolescence and the experience of women in Manu'a that is most germane to the argument, and it was on these matters that Mead did her most systematic research, so I shall concentrate on these issues.

Beginning with child rearing, Mead emphasized that in Manu'a a child could diffuse his dependence, taking up with a series of surrogate parents, running free in a broad extended family. Freeman argues that in Samoa, as elsewhere, the mother-child bonding is crucial, that adoptive relationships are rare, and that strong attachment to biological parents is the norm. Mead argued that children were indulged and enjoyed great freedom, but Freeman insists that parental discipline is strict, frequently violent, and that children are conditioned to accept authority without question. Children initially react with anger to this strict discipline, but are cowed by the threat of even more severe punishments. In consequence there is considerable covert hostility to parents.

A vital part of Mead's argument (and an important element in its popular appeal) was her observation that the Samoans did not suffer from sexual frustration. She did, however, admit that there was one snake in the grass - the *moetotolo*, or sleep crawler. "The *moetotolo* is the only sex activity which presents a definite abnormal picture. Ever since the first contact with white civilization rape in the form of violent assault has occurred occasionally in Samoa. It is far less common, however, to the Samoan attitude than *moetotolo*, in which a man stealthily appropriates the favours which men meant for another."

Freeman is scornful of this version. Samoans greatly value virginity, and when a girl marries her virginity is publicly tested in a defilement ceremony in which her husband breaks her hymen with his finger. "Virginity is normal until marriage - he and his wife even did a virgin census in one village (though presumably without the finger test). All this puts the activity of the sleep crawler in a very different light. He is not simply filching the prerogatives of an established lover; rather he is raping a virgin. And (contrary to Mead again) open, forceful rape is also a common Samoan custom. In both cases the aim is above all to insert fingers in the vagina to break the hymen. The girl thus deflowered is now left with no alternative but to marry her rapist. And that is the goal of the exercise."

Freeman has less to say on the crucial issue of adolescence. The thrust of his argument is that the Samoan youth are a fractious, violent lot and he provides statistics to show that the boys have a record of delinquency which compares unfavourably with that of the deprived youth of Chicago.

In the 1960s Margaret Mead recognized that the accounts of later observers in Samoa tended to diverge from her own on many points. She suggested two possible explanations for this. First, it was possible that she had happened upon an island, or a group of islands, that differed from mainstream Samoan culture, perhaps only temporarily. Freeman rejects this argument, and he has observations from Manu'a to back him up; but it is possible that at least some of the divergences might

be explained in this way. The second possibility she put forward was that she had inadvertently adopted the perspective of the girls with whom she had spent most of her time, and who would perhaps have a partial or distorted view of Samoan culture as a whole. This might again account for various divergences in her account, but it cannot explain away the apparent error in describing adolescent sexuality. Freeman proposes an uncharitable version of this reasoning. In his view she was indeed the prisoner of her girlish subjects, but instead of telling her the true facts of their existence they systematically duped her, with "counterfeit tales of casual love under the palm trees". Of these explanations I once spent a week interviewing the formidable Dr Mead for a BBC *Horizon* programme, and I find it difficult to believe that she could have been systematically duped by a group of village children over a period of several months, even as a young woman.

Freeman's critique is vulnerable on some points. His crucial section on adolescence, for instance, is thin, and it does not inspire confidence to find Professor Freeman citing figures on adolescent delinquency published by the notorious fraud Cyril Burt. However, while the critique is thin, humourless, grudging, unduly harsh, and sometimes lacking in judgment, it must be conceded that it is thorough, it can probably be broadly accepted. Margaret Mead got it mostly wrong. The question now arises, does it matter much?

Professor Freeman thinks it matters very much indeed. He does not see himself as a senior professor scourging the apprentice work of a young student of long ago. On the contrary, he is engaged in a heroic assault on a dominant myth of contemporary anthropology. This is very difficult to swallow. Even in the 1930s, the Boasians had better case studies at their disposal (including Margaret Mead's later work in New Guinea). It is true that Boas and several others lavished extravagant praise on *Coming of Age*, but it was never the mainstay of their theory. Moreover, after the Second World War American anthropologists - Margaret Mead in the vanguard - began to take a much more subtle and sophisticated view of the relationship between culture and heredity. Certainly today nobody in the profession would think of arguing the extreme cultural determinist approach. In consequence, the impact of Professor Freeman's critique must be less devastating than he seems to imagine.

What Freeman does demonstrate is that Margaret Mead's Samoan study was a rather poor piece of work by a young, barely trained graduate student with imperfect command of the vernacular - but who later went on to carry out more sophisticated and successful field studies in the Pacific. Margaret Mead was never an ambitious theoretician, and her theories were never very influential in anthropology. Her genius was to use exotic materials to point a moral about American culture.

Then why all the fuss now? *Coming of Age in Samoa* became a best-seller because it seemed to offer a "scientific" basis for a new educational policy. Tolerance of alternative mores, the acceptance of greater sexual liberty, the restraint of parental authority, all were granted a new legitimacy. Of course, these developments were not universally welcomed. Today they are generally in disfavour. Professor Freeman's book has therefore been welcomed by millions who will never read it, but who believe that it justifies stricter discipline, more sexual restraint, and suspicion of experiment. Margaret Mead's response would have been worth reading, but she left enough admirers behind her, including Pacific specialists, to ensure that her reputation will not lack defenders.

The debate is just beginning.

Adam Kuper is professor of anthropology at the University of Leiden.

The book which impressed me most deeply in my youth was Goethe's *Faust*; it has continued to influence my thinking ever since. I first read it at the age of 16 and have returned to it again and again. The earliest effect on me of *Faust*, *Pandora* and the poems of Goethe was to make me wish and try to become a poet. After I decided to make philosophy my life's work, I always felt greatly encouraged when my philosophical position was in harmony with the poetic content of *Faust*. To discern such harmony is not to imply that a work of art could be represented by or reduced to a set of philosophical theses. Such a view seems quite fatuous to me. Without trying to explain the possible harmony or disharmony between a work of art and one of philosophy, I shall give two examples of the way in which I take my own philosophical position to be in harmony with Goethe's great tragedy.

My first example refers to a philosophical problem which has occupied me for a long time and which I have discussed in my writings on the philosophy of mathematics and science. It is linked to the contrast between two kinds of thinking. One kind, which Mephistopheles pretends to despise and ridicules as drilling an individual's spirit and forcing it into inquisition boots, is thinking which is constrained by the strict rules of logic and, one may add, of mathematical sciences. The other kind which he praises as genuine thinking, he compares to a master craftsman's art of weaving, where one shuttle moves a thousand threads and makes a thousand contexts. Mephisto-

## MILESTONES

Stephan Körner chooses Goethe's *Faust*

tophones' advice to the student to abandon any attempt at thinking of the first kind is part of his scheme to make him despise "reason and science, the very highest power of man".

The difference between, and the interaction of, logico-mathematical thinking which is governed by strict rules, and common sense thinking which is governed by looser guidelines, have occupied philosophers since ancient times. Among influential modern philosophers Frege argues that all thinking when properly purified becomes thinking of the first kind, while Wittgenstein asserts that a philosopher's attempt to ask and answer questions after the fashion of science is bound to lead him or her "into complete darkness". Yet it can be argued that the appreciation of mathematical and mathematically formulated scientific theories to empirical phenomena - and its philosophical description - involves thinking in both the weaver's and the logico-mathematical way. For the application of these theories to empirical phenomena requires, first, that we describe our experience of "life's green free" in the weaver's idiom; second, that we transcribe this description into the constrained language of "grey theory" and draw

conclusions within its framework; last, that we transcribe these conclusions back into the language of theoretically unconstrained, living thought.

My second example is Goethe's conception of man which pervades the whole of *Faust*. Man for Goethe is "the little god of the world" who has the power of free choice and creation - an aspect of man's nature which Mephistopheles fears and hates. Goethe's conception is shared by Kant, who rejects the image of man as "a roaring jack which, having once been wound up", as we might say today, programmes, "executes its movements by itself" without choosing.

The problem of man's real or apparent freedom belongs to speculative philosophy. That is to say that even after a concept of freedom has been clearly defined, its applicability to human existence cannot be demonstrated. All that can be done - and all that I have tried to do for a concept of freedom resembling Goethe's and Kant's - is to show that it is internally consistent, that its applicability is consistent with the best available logical and scientific knowledge and that it does not offend common sense. That a concept of real freedom need not offend the common sense of those who live in the tradition of Western

culture - be they believers, atheists or agnostics - can, I think, be supported by distinguishing between the creative power of the biblical God and the creative power of man, whom He created after His own image. God's creative power is according to the book of Genesis twofold: He has the power to create out of nothing, as well as the power to impose order on chaos. I see no difficulty in ascribing some measure of the latter power to man, that is, not the power of *creatio ex nihilo*, but the power to impose some order on comparative chaos or disorder. In making this point, I am once again encouraged by a harmony between my philosophical position and Goethe's poetic work. I am also pleased that my philosophical conclusion is not at all troubled by my thinking of Goethe, Mozart, Kant or Einstein as little gods and not as roaring jacks of an admittedly very complex structure.

Goethe's occasional explicitly philosophical remarks have often been misinterpreted. Oswald Spengler, the author of *The Decline of the West* is alone in seeing a fundamental opposition between the content and the method of Goethe's and Kant's thought. In Spengler, Goethe stands for an intuitive philosophy of becoming, Kant for an analytical philosophy of pre-existing fact. This was not at all Goethe's view for he admitted the "great fundamental thoughts" of Kant's third *Critique* and regarded them as "wholly analogous to his own past work", because they clearly express the "inner life of art and nature and their interaction".



# BOOKS

## Jewish resistance

**The Jews of Warsaw 1939-1943:** ghetto, underground, revolt by Yisrael Gutman  
Harvester Press, £25.00  
ISBN 0 7108 0411 3

**The Civilian Population and the Warsaw Uprising of 1944** by Joanna K. M. Hanson  
Cambridge University Press, £19.50  
ISBN 0 521 23421 2

An underground newspaper in Warsaw remarked, of the ghetto uprising in spring 1943, that

the brave resistance of the Jews lifts the stain they brought upon themselves by their capitulation and lethargy in going like sheep to the slaughter rather than defending themselves. This is probably their first show of courage since the days of Bar-Kochba.

In summer 1942, a large majority of the original ghetto population had been evacuated to the death-camps, especially Treblinka, and there had been almost no resistance at that time; indeed, much of the rounding-up and herding was undertaken by Jewish police and on the orders of the Warsaw Jewish Council (whose chief, Adam Czarniakow, killed himself). This occurred even though, quite soon after the evacuation had started, the facts of the mass-killing were reported by courageous Jews who returned to the ghetto - and elsewhere in Europe - with the news.

A few months later, the remaining inhabitants of the ghetto became determined not to let themselves be carried off without a fight. Two resistance organizations flourished, acquired weapons, and constructed miniature fortresses within the ghetto.

Yisrael Gutman, professor of Jewish history at the Hebrew University, Jerusalem, was there. His book is virtually an eye-witness account, and is supplemented by documents in Hebrew and Yiddish that are preserved in Israel: the ghetto established an archive quite early on, and it survived, for the most part, to tell this horrible story. Czarniakow's diary, which had been presumed lost, turned up, in fact, and has been

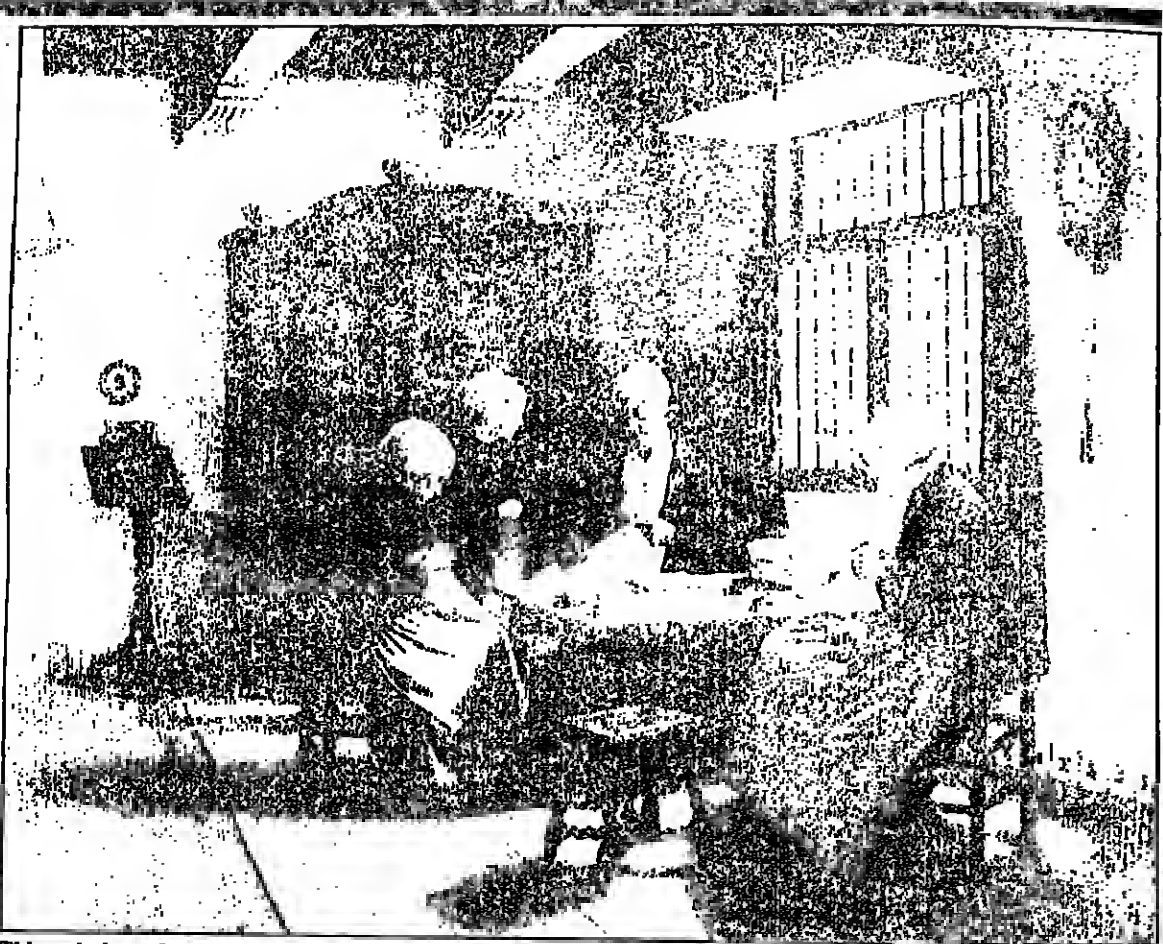
published in English; and a great deal more is kept in Israeli archives.

Professor Gutman's book does not, however, contain much information that cannot be found in various other sources: this is a subject that has been well worked-over, and though giving more detail of the street-fighting and the difficulties the Jewish resistance met on the Polish side, he does not present a substantially different picture. He devotes only four pages to "the question of response" by the Jewish Council (to the evacuation to Treblinka) and is very careful to be fair-minded: he will not, seemingly, become involved in discussion of this extremely contentious question.

Professor Gutman is more client about the "Aryan" Poles - they offered far less help to the Jews than they could have done, and even survivors of the ghetto uprising who took to the forests were often killed by Polish partisans. Still, his account of the uprising itself, and of the devices and manoeuvres through which a fighting Jewish consciousness came about, would be difficult to better. Another Polish newspaper said that "the Jews have risen to the level of a fighting people. They have demonstrated their right to national existence" - a remark that, no doubt, justifies Professor Gutman's moving book.

In 1944, the Polish resistance itself rose against the Germans. This story has also been told many times before, notably by Ciechanowski in a book which, calling attention to the ill foundations of the resistance leaders' assumptions, caused some scandal in the Polish community. The Home Army wanted to do what the French Resistance managed to achieve in Paris - to reconquer the capital before the foreign liberators arrived. In the Poles' case, this reconquest was a vital matter, since Stalin threatened to impose his own Communist-dominated government if Soviet troops arrived before the Poles liberated their capital.

In the event, the Germans fought back. They used Ukrainian troops (who behaved atrociously) and mustered some good units of their own army to recapture Warsaw after a heroic battle that went on from early August to late September. The civilian population caught in the crossfire is the subject of Joanna Hanson's book. She, too, has a horrible story to tell. She describes the sufferings of the civilians, quarter by quarter. Many civilians felt that the fighting was pointless. If the Germans were still there, with an intact army, then they could not be dis-



This painting, 'In the Orphanage at Katwijk-Binnen' by Adolphe Artz (1837-1890) is reproduced from *The Hague School: Dutch masters of the nineteenth century*, published by Weidenfeld and Nicolson at £16.50 and £7.95. The book is a catalogue to the exhibition of the same name which can be seen at the Royal Academy in London until July 10.

lodged by irregulars who were badly armed; better wait for the Russians. The Home Army authorities regarded these attitudes as treacherous, and decided, with fantastic bravery, to fight on. Little help came from outside; and Hitler - or Himmler - decided that Warsaw must be utterly destroyed, as a warning to other European cities. In a weird photographic negative of the Hitler-Stalin Pact of 1939, the Soviet army did little to help Warsaw, and cynically sat on the other side of the Vistula to watch its Polish enemies being destroyed.

Miss Hanson obviously loves Poland, and she writes about it all very solidly, and with feeling. So would we all.

**Norman Stone**

Norman Stone is a fellow of Trinity College, Cambridge.

of Christianity about human character, and that most divisive and conservative of all institutions, the nuclear family sanctioned by "the priesthood of the old immoral world".

Owenism was expressed most clearly in this "pure" form between 1835 and 1845 through a variety of propagandist organizations which aimed to convert public opinion and promote the building of a socialist community at Queenwood Farm in Hampshire. Though to Owen the latter was of overriding importance, the story of his followers the attack on the old world, through the advocacy of freethought and feminism, was central. Such an emphasis has lain outside the scope of traditional labour history, and has surprisingly also been ignored by feminist historians. Dr Taylor's book is therefore a welcome addition to the historiography of the subject.

The Owenite doctrine of circumstances, that people become what they are through the conditioning of their environment, opened up a critical reconsideration of the position of women in early industrial society.

Socialists above all others contributed to this in the second quarter of the nineteenth century. Dr Taylor's subject matter comprises the ideas, issues, personalities and practical working out of socialist feminism during these years. She discusses not only Owen, with his startling *Lectures on the Moralities of the Priesthood of the Old Immoral World* (1835), but also a number of other men and women, some well-known and others deservedly now rescued from near-oblivion, whose writings and lectures contributed much to the feminist agitation of the nineteenth century.

These include: William Thompson, Irish landowner and author of *Appeal of One-Half the Human Race*; Anna Wheeler, the probable co-author and socialist pioneer; James Morrison, editor of the *Pioneer* trade union paper, and his wife, Frances, who lectured on socialism and wrote a pamphlet on marriage; J. E. Smith, editor of Owen's *Crisis*, who briefly brought Southcottian ideas on Fanny Wright of Dundee, who wrote *Woman into the socialist debate*; "rational dress" and set up a community for freed slaves at Nashville, Tennessee; Eliza Macaulay, a poverty-stricken lecturer on cooperation in the early 1830s; Margaret Chappell, who specialized in economics lectures in the early 1840s, and later died at New Harmony, Owen's community in Indiana; and, above all, Emma Martin, the scourge of priests in the 1840s and advocate of rights for women. In addition there is a brief section on the foremost Owenite feminist, Eliza Sharples

from Bolton who bust on the London lecture scene in the early 1830s as "Isis", edited a periodical of the same name, fell in love with the imprisoned radical publisher of blasphemy and sedition, Richard Carlile, and advocated feminism in London for the next twenty years.

The Owenites attempted to practise what they preached, in the social life of their local societies and at the Queenwood Community. Yet even here with the new Eve and old Adam died hard. Years of conditioning left Owen's disciples unprepared for the millennial transformation which he promised. Women at Queenwood resented the attempt to break up their nuclear families, and preferred their cold private rooms to warmer communal facilities; "women's work" in the laundry was still done by the women; and, despite all malicious rumours to the contrary the only marriage to take place at the community was a conventional affair at the local parish church. Reality was often far removed from the theory.

Despite clear calls to feminist action in the introduction and conclusion to her book, Dr Taylor shows herself to be under no illusions about her subject matter. Rather, unsound generalizations about "bourgeois radicalism" and Evangelical religion are quickly qualified in the body of the text, and she recognizes that, just as some men were active feminists, so some women were not. Such an acceptance of life by most women is not dismissed as mere "false consciousness" but is related to the actual needs of vulnerable women who in their daily lives valued the legal protection of marriage as much as they desired the occasional escape clause of easier divorce. As for the men, their hostility to the equal claims of women is put within the context of "unskilled" female labour challenging skilled male labour in declining traditional markets.

For these reasons the advanced thinking of the Owenites made little permanent impact. A few lonely voices remained after the failure of Queenwood in the mid-1840s. They belonged chiefly to freethinkers like G. J. Holyoake who, while for the most part losing some of their socialist economics, at least maintained the Owenite critique of religion and sex-misuse. As Dr Taylor observes there is much scope for further work here, and she is to be congratulated on having so ably opened up the subject.

**Edward Royle**

Edward Royle is lecturer in history at the University of York.

# BOOKS

## Fair Shares

**The Territorial Dimension in United Kingdom Politics** edited by Peter Madgwick and Richard Rose  
Macmillan, £25.00  
ISBN 0 333 29403 3

As a number of long-established assumptions about British politics are challenged, so teachers and students require studies which are not only up to date but also include the new issues. One area ripe for revision is the politics of the United Kingdom. The upsurge of political nationalism in Scotland and Wales in the late 1960s ended the national hegemony of the Labour and Conservative parties. Added to events in Northern Ireland they also raised questions about the British constitution and the continuance of the United Kingdom as we knew it.

The merit of *The Territorial Dimension in United Kingdom Politics* (and Richard Rose's companion volume, *Understanding the United Kingdom*, Longmans) is that it examines the political interrelationships between the different nations, rather than discussing the politics of the four nations separately. The authors are appropriately aware of the importance of the territorial crises in British politics between 1880 and 1920 and avoid the dead duck of devolution. Territorial politics, as discussed by the authors, involves regional and national claims for "fair shares" of material benefits, claims for recognition of distinct cultural and national identities and demands for self-government. The essay by James Kellas and Peter Madgwick also shows the importance of the pork barrel in territorial politics.

Richard Rose challenges many constitutional texts by posing the question, "Is the United Kingdom a State?" His answer is that it is "almost a state"; or "Except for Northern Ireland the United Kingdom is a state" (page 128). Defining characteristics of a state include the security of its frontiers and the government's monopoly of force. Northern Ireland always qualified generalization about British politics. In Northern Ireland, the rule of the British government is openly and violently defied, the regime lacks support and the border with the south is insecure. In proposing his theory of "Ulster exceptionalism", Rose might have recognized that the status quo is an option for Westminster politicians, given the province's psychological and geographical distance from the mainland.

Ian McAllister shows that the Scottish and Welsh Nationalist parties and the SDLP in Northern Ireland differ as "nationalist" political parties. They also vary in their ability to mobilize their core-group support. In 1979, the SNP gained 21 per cent of the votes of Scottish electors, the Plaid Cymru 17 per cent of the Welsh speakers, and the SDLP 65 per cent of Catholics in Ulster. Each attracts only desirous support outside these core groups. Yet they have succeeded in extracting concessions from Westminster governments and placing their issues on the political agenda. Surely this has been a spectacular "con trick", which the referendum did something to expose.

The essential planks of the "top down" model of British political management have been Parliamentary supremacy, ministerial responsibility and Whitehall control. The political centralization and integration have been reinforced since the 1920s by two national political parties competing for full political power. Yet before then, Labour was also a party of Home Rule and municipal socialism, the Conservatives a party of localism, limited government and pluralism. Barry Jones and Michael Keating show how Labour, faced with the prospects of political power, soon settled for political centralization (for economic planning and redistribution) over decentralization

(for participation and democracy). Help for the whippers (and Labour strongholds) would come through central allocation of the government pork barrel not through constitutional changes. Ideology reinforced electoral expediency.

Jim Bulpin presents a subtle and provocative study of the "operational code" of the Conservative party. He demonstrates how the central theme for the Parliamentary leadership since the rise of popular government and territorial crisis of the 1880s has been a quest for its autonomy in matters of "High Politics" (foreign and imperial questions, defence, and political tactics). Once achieved Conservative leaders were indifferent to the consequences and local government. Bulpin is particularly good in arguing that Mrs Thatcher and Mr Heseltine have been interventionist in local government in pursuit of gaining autonomy for the centre; under the guise of opposition to intermediate corporate power and the development of local citizen autonomy, the Conservative leadership is attempting to return to its traditional Salisbury code, seeking the re-establishment of central authority.

There are other interesting essays on the Scottish and Welsh offices, industrial policy, Welsh language and electoral behaviour. Inevitably, an edited book of essays lacks a central argument and neglects interesting contributions. In particular, there is no persuasive explanation for the revival of the territorial issue in the 1970s, or any attempt to sort out the different theories on offer. Even then, the 1970s pale by comparison with the centrality of territorial and nationalist politics for 1880-1914. "Rise" or "decline" depends on your base line. Moreover, given the growth of studies of the non-English nations the English system is in danger of being neglected. England has no distinctive political institution and no Cabinet spokesman claiming special status. The study of "UK politics" should avoid over-correcting a traditional imbalance.

**Dennis Kavanagh**

Dennis Kavanagh is professor of politics at the University of Nottingham.

## Union views

**Unions, Change and Crisis: French and Italian union strategy and the political economy, 1945-1980** by Peter Lange, George Ross and Maurizio Vannicelli  
Allen & Unwin, £20.00  
ISBN 0 04 331088 5

How have the trade union movements of western Europe responded to the economic crisis of the 1970s? How can we account for their responses? What new insights into trade union behaviour can we gain from a comparative survey? For the last five years a research group at Harvard's Centre for European Studies has addressed these questions: in this book, the first volume of their reports (the second will cover Britain, Germany and Sweden), Peter Lange, George Ross and Maurizio Vannicelli deal with French and Italian unions and Franco-Italian comparisons.

The overall patterns of trade union organization seem similar in France and Italy. The biggest union confederations in both countries - the CGT in France and the CGIL in Italy - are dominated by Communists, and are closely linked with their respective Communist Parties. Next in size are the CFTD (France) and the CISL (Italy), the representatives of militant social Catholicism. Finally there are the social democratic organizations, the French FO and the Italian UIL, both of which appeared in 1948 as anti-Communist splinter movements.

In both countries these three-way ideological divisions remained strong for almost two decades after the Second World War. In the 1960s, however, in both countries, the union confederations began tentative

contacts and joint actions. The importance of divisive issues was reduced by de-Stalinization and the cold war thaw. Catholic liberalization after the Second Vatican Council and rapid economic growth, industrialization and urbanization in France and Italy, inter-union cooperation, however, was to be more real and lasting in Italy than in France. The disparity of the French unions in the late 1970s reflected interesting differences between the economic and political structures of France and Italy but also marked contrasts between their Communist Parties.

Italy started poorer and faced chronic problems of unemployment and regional imbalances. Its economic growth rate faltered earlier - albeit after 25 years of rapid expansion - and the "oil crisis" and "recession" hit harder, sooner, and deeper than in France. All three Italian union bodies pursued cautious paths. They feared both "outflanking on the Left" and threatening the continuation of economic growth by excessive demands or disruptive actions. Large and rather decentralized in organization, their capacities for "controlling" shop-floor demands were limited. The 1969 "hot autumn" showed the strength of workers' expectations, but the consequent wage rises and indexation agreements soon demonstrated the fragility of the Italian economy. The labour market situation suggested caution and moderation and the political situation facilitated union action. The weak unstable coalition governments of postwar Italy often seemed incapable of effective action and union leaders saw unified union pressure for realistic reforms could push the politicians forward. The Italian Communist Party (PCI), as it expanded, liberalized and came closer to power was willing to allow the CGIL an increasing independence.

In France, too, the CGT appeared more moderate, cooperative and indecisive when the French Communist Party (PCF) seemed near to power in 1974 and during the two years before the 1978 general elections. Unlike the PCI, however, the PCF had not really liberalized or given any real autonomy to the CGT. The increasing numbers of critics of the CGT's successors and their policies were mobilized by the Socialist Party, not the Communists, during the 1970s. The radicalized Socialist programme favouring "self-management" (autogestion) won the sympathy of many CFTD leaders while traditional Socialist links with FO remained strong. By 1977, the PCF feared that its now dominant ally and rival, the Socialist Party, would undermine its own electoral base. It began to attack the Socialists as "reformists", responsible for the right-wing defeat in 1978. The COT was mobilized to maintain working-class support for the PCF. CGT demands were exaggerated to keep pace with PCF attempts to "outbid" Socialist criticisms of government policies. CGT leaders supported the Russian invasion of Afghanistan and Georges Marchais as presidential candidate in 1981. Of course, neither the CFTD nor the FO would follow. The CFTD "renewed" its position after the Left's 1978 electoral defeat.

This study is organized into three sections. The country case studies by Ross (France) and Lange and Vannicelli (Italy) are rather difficult because they devote too much attention to ideology and too little to action. They also unfairly neglect the non-Communist unions. In the final section Lange and Ross draw some comparative conclusions and consider the unions as actors rather than thinkers. The CGT and CGIL re-emerge as complex organizations with varied goals which both respond and take initiatives in relations with employers, governments and political parties.

This interesting analysis leads the reader to doubt whether union economic thinking in fact plays the role suggested by the authors in their introduction. In short, it is this consistency which makes the book so stimulating.

**Howard Machin**

Dr Machin is lecturer in government at the London School of Economics.

## Doomed to fail

**Soldiers of Peru: Argentina's Montoneros** by Riehan Gillespie  
Clarendon Press: Oxford University Press, £19.50  
ISBN 0 19 821131 7

The Argentine guerrilla organization known as the Montoneros was the mightiest guerrilla force ever assembled in Latin America; during their peak year of 1975 they had some five thousand men and women under arms. Their income from kidnappings that year amounted to \$70m and several clandestine workshops furnished them with a steady supply of weapons. But the Montoneros also suffered one of the most thorough defeats ever inflicted on a guerrilla army: by August 1978 they estimated their fatalities as 4,500.

Richard Gillespie's book is an attempt to explain why the Montoneros were doomed to failure. Argentina is more complex than the facile stereotypes common in this country suggest. Indeed, Argentines themselves are equally prone to misunderstand their own history. An important current of Argentine thought has highlighted nationalist aspirations to the detriment of a serious and coherent account of the class conflicts which are endemic in that society. So it was with the Montoneros, who, Gillespie shows, were totally attracted to certain nationalist myths which were to prove the principal source of their eventual defeat.

The movement originated in right-wing Catholic nationalist groups which were radicalized in the 1960s, engaging in a superficial flirtation with Marxism. Towards the end of that decade there was a widespread repudiation of the existing military dictatorship and a return to power of the Peronists became increasingly

likely. Radical nationalists who looked back to the heroic days of rapid industrialization and rising wages in the 1940s, the Peronists were to win the elections of 1973 and remain in power until the present military regime threw them out three years later.

The Montoneros emerged in 1968 as an armed pressure group of the Peronist movement. Unconditionally loyal to Juan Peron, recruited overwhelmingly from middle-class backgrounds, they believed that Peron would lead them toward a genuinely national form of socialism. Their political beliefs were woefully naive, leading them to put their faith in utopian schemes of class collaboration and in an opportunist leader who cynically used them as a counterweight to other factions in the Peronist movement and who turned against them when they no longer served his purpose. Bewildered and confused, the Montoneros returned in 1974 to armed struggle, first against the Peronist government of Isabel Peron and then against the military regime which ousted her.

Their mistaken analysis and their highly militant organizational style cut them off from potential allies in the working class. Internal demoralization completed the job. Together with tens of thousands of their compatriots they fell victim to the ruthless repressive measures of the military regime.

Richard Gillespie has told their story with care and sensitivity. His book, coming as it does on the eve of a return to civilian government in Argentina, is a timely contribution to our understanding of that country. But whether the myths that fuelled the Montoneros' ill-fated enterprise have been dispelled remains to be seen.

**Ian Roxborough**

Ian Roxborough is lecturer in the political sociology of Latin America at the London School of Economics and at the Institute of Latin American Studies, University of London.

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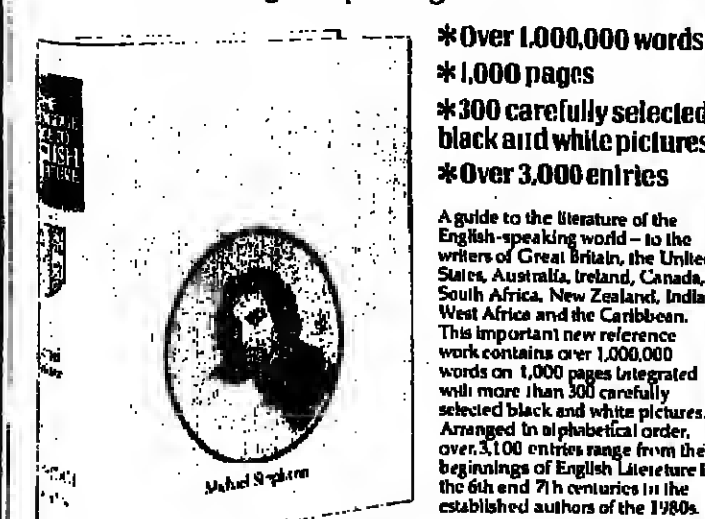
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# BOOKS

## Military power

The Pursuit of Power: technology, armed force and society since 1000  
by William H. McNeill  
Blackwell, £15.00  
ISBN 0 631 13134 5

This bold and generally persuasive survey of Far Eastern and European history over a thousand years can be read on two levels: as a quasi-scientific discourse or as a more straightforward account of the evolution of military power in its economic, technological and political context.

In his preface the author describes the book as a twin of his earlier study *Plagues and Peoples*, and whose theme is "changes in patterns of macroparasitism among human kind". Alterations in armaments are likened to "genetic mutations of micro-organisms in the sense that they may... open new geographic zones for exploitation, or break down older limits upon the exercise of force within the host society itself". Fortunately Professor McNeill has refrained from using the language of epidemiology and ecology and only occasionally reminds the reader of these underlying interests.

Between about AD 1000 and 1500 China set the pace in military technology, developing the cross-bow, guns and warships, until overseas exploration, financial investment and scientific experiment were stifled by bureaucracy in the service of cultural isolationism. Arguably the same course would have been followed in Europe had the papacy, with its hostility to the ethos of the market place, achieved effective sovereignty. Instead the emergence of a congeries of city states and petty kingdoms permitted a merger of market forces and military institutions. The commercialization of organized violence was epitomized by the prominence of mercenary armies in the fifteenth century. Machiavelli's hostility to mercenaries has been echoed by generations of historians, but McNeill suggests the renewed preference for professional to citizen soldiers in our own times could cause us to view the defence arrangements of the Italian cities more sympathetically.

The development of bronze, brass and eventually iron guns from the late fifteenth to the mid-seventeenth century is described in great detail, but always with a view to artillery's wider effects in terms of internal unification and overseas conquest. As McNeill neatly puts it, the extent of the Mughal, Muscovite and Ottoman empires was defined in practice by the mobility of their respective gun parks. West European states outstripped the Eastern empires mainly because of the intense competitive development of weapons resulting in a superior combination of

warships and artillery. This made possible a remarkable period of overseas imperialism.

Naval warfare tended to be more profitable than land operations. McNeill argues that the noblemen who played leading roles in European armies were for the most part contemptuous of pecuniary calculations. Their ideals of martial prowess and honour were fundamentally at odds with the financial, logistic and administrative aspects of military management. By contrast, knightly ideals were firmly subordinated to finance in the fitting out of ships for long voyages, and investors carefully measured their costs against prospective returns in a way that was seldom possible in land warfare. This was, however, only a matter of degree. Early modern armies were usually an aggregation of independent companies each raised and equipped by a captain who was as much an entrepreneur engaged in a business transaction as a purely military careerist. Land conquests yielded booty and ransom payments to the officers, but often impoverished the state. Siege operations in particular were notoriously expensive and indecisive. Philip II of Spain had to repudiate his debts on four occasions and never managed to pay his soldiers on time. Nevertheless McNeill sees warfare, and the escalating costs of waging it, as providing much of the dynamism behind European commercial and political progress.

By the eighteenth century overwhelming force resided in armies obedient to kings and prepared to crush either aristocratic rivals or lower class rebels. Accordingly, Europe began to enjoy a previously unattainable level of domestic security which facilitated a remarkable increase in wealth. The most powerful states could now support professional standing armies on tax income without exhausting the economic resources of the population. With characteristic originality, McNeill focuses on drill, and the murderous close-order tactics it made possible, as a prime ingredient of European military superiority. His own experience in the Second World War is invoked in testimony to the psychological benefits of drill.

In contrast to such distinguished economic historians as J. U. Nef and W. W. Rostow, McNeill contends that war played a positive role in boosting the industrial revolution. Citing the experience of Britain in the period 1793-1815, he suggests that government war expenditures profoundly affected both the absolute volume of production and the mix of products from British factories and forges. He sees, for example, a direct link between the wartime impetus to iron production and Britain's postwar lead in the manufacturing of steam engines, railways and iron ships.

A brilliant section describes the development of arms firms as technological pioneers from the later nineteenth century. By 1914 public and private concerns in the armaments industry had become densely intertwined and it was easy to allege that capitalists' cynical pursuit of profit was the overriding consideration. McNeill shows, however, that the arms trade recruited many original

minds attracted primarily by the challenge of technical and business problems.

Although the two chapters devoted to the World Wars provide excellent concise accounts of the problems and consequences of mobilizing for total war on an unprecedented scale, there is a slight sense of falling away from the high level sustained for the coverage of the seventeenth to the early twentieth centuries. Indeed from the 1930s onwards the treatment becomes increasingly impressionistic, although this is a minor defect in the light of the distinction of the volume as a whole. There are also some speculative passages, such as the notion of population pressures as a main cause of modern war, which sit uneasily amid long technical descriptions of the development of weapons and warships.

The final chapter traces the evolution of increasingly destructive weapons systems since 1945 and suggests there is a risk from "internal decay" in the frustration of the armed forces' traditional values in an era of push-button war. McNeill sees the arms race continuing inexorably, fuelled by economic and scientific imperatives which were formerly such benevolent agents, until mankind annihilates itself. The only alternative lies in drastic political change to establish a global sovereign power with a monopoly of atomic weaponry. Also, however, McNeill's "empire of the earth" sounds like a cure worse than the malady. How would it be arrived at except as the outcome of the very Great Power conflicts it is supposed to prevent; and why assume that the eventual victor would be more tolerant than, say, the Soviet Union today? The volume concludes with a two page appreciation of what the "millennium of upheaval" AD 1000-2000 will look like to historians a few hundred years hence, so perhaps Professor McNeill is an optimist after all.

This study, displaying extraordinarily breadth of scholarship, certainly deserves a prominent place in university reading lists as one of the most comprehensive, incisive and stimulating histories of military power ever written.

Brian Bond

Brian Bond is reader in war studies at King's College, London.

## Indus legacy

The Rise of Civilization in India and Pakistan  
by Bridget Allchin and Raymond Allchin  
Cambridge University Press, £25.00 and £8.95  
ISBN 0 521 24244 4 and 28550 X

Allchin and Allchin published their admirable account of *The Birth of Indian Civilization* in 1968. Their new book, while ostensibly covering much the same ground, reflects the many recent developments in the archaeology of the Indian subcontinent, developments in which they have played an important role, a fact which lends additional authority to this new synthesis of the results of recent fieldwork and analysis.

Their theme is the growth of urban culture in the subcontinent, the Indian equivalent of the developments in the Nile Valley, Mesopotamia and the Yellow River valley; its relationship with the preceding prehistoric cultures, both palaeolithic and more recent; the impact of the Aryans invaders upon this urban structure; and finally the emergence of a new stage which underlies the whole pattern of present-day civilization in Bangladesh, India and Pakistan as well as in Sri Lanka.

The work is divided into three parts: Constituent elements; Indus urbanism; The legacy of the Indus civilization. The first part is concerned with the stone-using cultures which, particularly in the case of the older phases, are now being redefined to take into account recent geological research. Crude tools, mainly in quartzite, give way to more



Title-page to M. Drayton's *Poly-Olbion* (1612-22), illustrating the antiquarian fervour of the period. The central figure of Albion, flanked by historical figures evoking "Great Britannie's" past, is a young maiden holding a sceptre and a cornucopia and personifying Britannia wrapped in a "cartographic cloak" to symbolize the land. Taken from *English Map-Making 1500-1650: historical essays* edited by Sarah Tyacke, published by the British Library at £20.

sophisticated forms which, in the Middle Palaeolithic, show increasing diversity of techniques and types as well as regional variations.

Diversification and increasing adaptation to changing conditions continued through the Upper Palaeolithic, including changes in materials being worked and in hunting techniques. With the beginning of the Holocene (about 9000 BC) these developments led to a phase which, as the authors rightly note, has persisted to the present.

Environmental change was brought about by deliberate human intervention. Microthitic industries in association with hunting, fishing, pastoralism or simple agricultural cultures have been recorded throughout the subcontinent and Sri Lanka. Large factory sites, producing tools for trading over wide areas, point to the growth of cultural interchange. In the Indus Valley itself microlithic industries are found in what seem to be permanent settlements which represent early phases of the Indus urban civilization or of an immediately preceding stage.

The great cities of Mohenjodaro and Harappa emerge as the natural, almost inevitable successors to the Mesolithic cultures of the region. Nor does the sequence end there, for the famous present-day pilgrimage site of Pushkar south of the Thar Desert, with its traditional cattle fair, is surrounded by mesolithic sites comparable with centres of the Panjab and the Indus itself.

The section on Indus urbanism begins with an account of the way new patterns of settlement developed in the whole of the Indus system as long-range trade gave rise to substantial centres serving as entrepôts and growing into towns or even into what the authors describe as "caravan cities". A notable example is Mundigak, southern Afghanistan, the four main periods of which show, over a number of centuries, growth from a simple settlement to a substantial town with great defensive walls, a palace and a temple complex. The latest stages of which are contemporary with the mature Harappan phase.

In the Indus drainage, countless sites show a growth from oolithic cultures, of a common type, to full Harappan urbanism. This mature culture is discussed with great clarity in two long sections which clearly show how strong are the links with preceding cultures. The nature of the Harappan town is discussed, together

with the characteristics of its architecture. Trade and agriculture receive proper attention, as befits key elements in the maintenance of urban cultures. There is also a long account of Harappan technology and the surprisingly few examples of Harappan sculptures as well as of the seals.

Part three, "The legacy of the Indus civilization", sets out to show first of all what happened in the Indus valley and the Panjab after Harappa and also in the Jamuna and the river system of the Ganges, which runs eastwards below the line of the Himalaya to flow into the Bay of Bengal to the east of Calcutta.

This is followed by a discussion of what happened in peninsular India. The link here is through the southern nuclear region to the south of the Thar Desert and which seems in fact very little influenced by Harappan culture, even though a site near Udsipur was clearly flourishing at the same time as mature Harappa. There are also links with the northern nuclear region between the Indus and the Doab, suggesting that there was a tradition strong enough to check the spread of Harappan culture to the south-east of the Indus system. What did occur outside the Indus region is subsumed in forty extremely detailed pages on the present state of our knowledge.

This is followed by a very well-balanced account of the arrival of the Indo-Aryan speakers, first detected perhaps in Swat about four millennia ago, and possibly at Kalibangan, about 200 kilometres south-east of Harappa, where an intrusive culture is found above a mature Harappan level. Whatever linguistic and religious benefits they brought, the Aryans seem to have put an end to urbanism and to writing, as the next inscriptions date from the time of Ashoka, mid-third century BC.

A. H. Christle

A. J. Christle is senior lecturer in the art and archaeology of South East Asia at the School of African and Oriental Studies, University of London.

*Information Sources in the History of Science and Medicine*, a guidebook to the field and its literature, has been edited by Pietro Corsi and Paul Weindling and published by Butterworth at £30.

# BOOKS

## CHEMISTRY

### Practical technique

Education and Teaching in Analytical Chemistry  
by G. E. Bishlescu, C. Patroescu and R. A. Chislers  
Ellis Horwood, Wiley, £16.50  
ISBN 0 85312 384 5

In the 1950s many courses in chemistry in the British higher educational system contained a considerable amount of analytical chemistry, at least on the practical side. Practical courses in inorganic chemistry had large sections of quantitative analysis in the form of volumetric and gravimetric work; and qualitative analysis, either by use of group separation tables for inorganic cations and anions or by identification of functional groups followed by preparation of derivatives for melting point determination, was a feature of organic practical work.

Undoubtedly these practical courses, if carried through conscientiously, helped promote good practical technique and it is likely that although present courses have very different objectives - knowledge of reactions, of methods of preparation, solving problems of structure from physical methods - good practical technique is rarely one of the chosen objectives of the courses.

An understanding of the chemistry behind the analytical experiments was allegedly a fundamental point of the old courses, although some of the work could be carried out by rote learning. Qualitative analysis was generally popular with students who appreciated the detective work inherent in many of the separations and identifications.

The character of practical chemistry courses has changed markedly during the past 20 years, partly because of a desire to use practical work to illustrate more directly the lecture content of courses and partly because of a desire to conform with educational theorists who advocated teaching through research - at undergraduate level through projects. For various reasons the formal analytical content of courses as a whole has declined, so that recently in Britain and the United States trained analytical chemists have been in short supply and in considerable demand by industry. The Royal Society and the Science and Engineering Research Council have been concerned at the shortage of analytical chemists, although I am not clear as to whether there is a real shortage of chemists who can do analytical chemistry, particularly using modern physical chemical methods, or a shortage of analytical chemists. It seems, however, that in eastern Europe analytical chemistry is still in high regard.

This book contends that modern analytical chemistry is a unified and independent scientific discipline. The authors give their preferred method of achieving an education in analytical chemistry - rather surprisingly emphasizing acquisition of knowledge through lecture courses and practical work and the acquisition of practical expertise. Project work as an educational medium is virtually unmentioned as a project motive as a reason for development of instrumentation.

It is not clear whether the authors advocate undergraduate courses which are wholly analytical chemistry (analytical chemistry is currently largely taught in masters courses at postgraduate level) and of course they do not say what should be omitted to make way for analytical chemistry. Unfortunately, the authors overstate their case in many respects - for example, by stating that the elemental and structural analysis of organic compounds are part of analytical chemistry. The methods of structural analysis are part of physical chemistry and a mere knowledge of structure without

an understanding of the reason behind the structure and the importance of the structure would be of little use to any chemist.

The authors did not set out to provide a textbook of analytical chemistry. The detailed coverage of topics is necessarily arbitrary. For example, the quite comprehensive discussion of atomic absorption spectroscopy, anode stripping voltammetry, and various techniques for surface analysis contrasts with the scant attention paid to Fourier transform infrared spectroscopy and the implication that nuclear magnetic resonance spectroscopy is mainly of importance for the study of dynamic effects. The references given are generally to books or reviews and would thus be of considerable use as sources for further study.

To emphasize the literature explosion, the book highlights the fact that many courses seem determined to cram in more and more material and to pay little attention to the future use to which students might put the information presented. Although chemists have been proud of the breadth of their subject while conserving detail, there has been too little informed discussion about whether there should be specialization in say the final year of an undergraduate course or which of the following are of such fundamental importance that they must be taught in an undergraduate course: an understanding of the financial accounts of a chemical company, an appreciation of research strategy, the synthesis of terpenes, bonding in organometallic derivatives, or the isochlorides of sampling Marston dust.

This well-written and thought-provoking book deserves to be widely read. It contains more interesting quotations than I have ever seen in a scientific monograph. However, perhaps because the educational system of the authors are so different (Romanian and Scotland), it does not seem to me to come near to providing an answer.

David Sharp

David Sharp is Ramsay Professor of Chemistry at the University of Glasgow.

## Organic synthesis

Guidebook to Organic Synthesis  
by Raymond K. Mackie and David M. Smith  
Longman, £9.95  
ISBN 0 582 45592 8  
Organic Synthesis: the disconnection approach  
by Stuart Warren  
Wiley, £19.00 and £7.95  
ISBN 0 471 10160 5 and 10161 3

The decision to divide chemistry into inorganic and organic branches originated in the belief that organic compounds had a necessary association with living plants and animals, a belief that remained unchallenged until urea was synthesized in 1828. Urea is a typical organic compound and its synthesis in the laboratory from inorganic starting materials is a classic experiment which not only disposed of the vital force theory but also led to the modern definition of organic chemistry. Organic chemistry is the chemistry of compounds of carbon, and many examples can be quoted which demonstrate the profound and beneficial influence of synthetic organic chemistry on our everyday lives.

More than one million organic compounds have been synthesized in the laboratory and many of these compounds are now produced industrially on a colossal scale. Such compounds include anaesthetics, oral contraceptives, plastics, polymers, synthetic fibres, paints, detergents, disinfectants, pharmaceuticals, agrochemicals, fertilizers, herbicides, insecticides, fungicides, food preservatives, vitamins, perfumes, photographic materials and dyestuffs. Furthermore, many known organic compounds represent new forms of matter which were first synthesized in the laboratory. During the period 1850-1950, the

development of synthetic organic chemistry was based primarily on the chemistry of functional groups. However, since 1960, the subject has been transformed and now there is a completely different approach to the practice of organic synthesis. Functional groups are specific assemblies of particular atoms and the chemical behaviour of organic molecules is essentially determined by the types of functional groups which are present in their molecular structures. Thus, there are many different types of organic molecules containing oxygen atoms including alcohols, aldehydes, ketones, carboxylic acids, ethers, esters, lactones, peroxides, phenols, coumarins, and xanthenes. Each of these classes of organic compounds contains particular functional groups which essentially determine their chemical properties and the way in which they can be used as intermediates in organic synthesis. This approach forms the basis of Mackie and Smith's book.

After a survey of the main types of functional groups, a detailed presentation is made of the utilization of particular functional groups for the creation of carbon-carbon bonds and of carbon-oxygen, carbon-nitrogen, and carbon-sulphur bonds. Methods of organic synthesis are reviewed which involve reduction, oxidation, protecting groups, and modern organic reagents containing boron, phosphorus, and silicon. This monograph relies almost entirely on the traditional approach to organic synthesis, based on the chemistry of functional groups. The description of the new approach to the synthesis of organic molecules involving retrosynthetic analysis and synthon recognition is rather superficial.

In contrast, Warren's book provides an instructive and stimulating account of the new methods which are now used by organic chemists to plan the synthesis of complex molecules. Retrosynthetic analysis and synthon recognition provide the foundation for a book which has all the characteristics of a scholarly work. Students and practitioners of organic chemistry will find the book valuable, because it is the first general account of the methods which should be used to plan organic syntheses in a logical and systematic fashion. The fact that organic chemistry is an experimental science is not overlooked and Warren emphasizes that planned syntheses are useful only when they have been tested by experiment in the laboratory.

The disconnection approach advocated by Warren is an intellectual exercise in which the constitutional formula of the target molecule is transformed by bond cleavage into smaller fragments (synthons) which eventually provide a basis for the selection of starting materials and reagents. Many of the strategies which are now used by research chemists for the synthesis of complex molecules have been generated by the disconnection approach. These methods are also amenable to computer treatment, and computer-assisted synthesis is now a useful tool in the examination of sequences of synthetic reactions designed to lead to target molecules.

This book is an excellent contribution to the chemical literature which conveys the spirit of excitement, challenge and adventure which motivates many organic chemists today.

W. D. Ollis

W. D. Ollis is professor of organic chemistry at the University of Sheffield.

A second edition of Alan J. Walton's *Three Phases of Matter*, originally published by McGraw-Hill in 1976, has been published with minor revisions by Oxford University Press at £25.00 and £10.95. The Press has also released a second edition in paperback only (£8.95) of W. Graham Richards and David L. Cooper's *Ab Initio Molecular Orbital Calculations for Chemists*.

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## BOOKS

## CHEMISTRY

## Organic reactivity

Reactivity in Organic Chemistry  
by Gerhard W. Klunpp  
Wiley, £39.10  
ISBN 0 471 06285 5

Although this book is a translation of *Reaktivität in der Organischen Chemie* originally published in German in 1977, the author has managed to incorporate a significant amount of new material and to include work published up to 1980. The quality of translation is on the whole good, and the book is well produced with a large number of useful diagrams.

It is particularly concerned with providing an understanding of why a particular reaction pathway is followed, in order that the optimum conditions for carrying out a particular chemical transformation may be selected. It attempts to achieve this by analysis of a vast amount of experimental data, particularly material not at present treated in other texts. Unfortunately, the author has not been successful in his aim, as the book is more a physical organic chemistry text. As such, however, it presents a lot of interesting material (in the form of reaction schemes and tables).

Even so, the author has dealt with too much material without a sufficiently lucid discussion of its significance. For example, (and rather surprisingly in view of its relevance to the author's aim), the book mentions Baldwin's rules for ring closure with-

out explaining clearly the terms involved and with only one example. It is doubtful if a reader unfamiliar with this topic would learn anything from the limited discussion presented here. Similarly, in other areas, although a lot of material is presented, the level of discussion is generally poor; and the author frequently fails to define the terms and constants he has used, making it difficult for the book to be used without reference to the original literature (a particularly irritating feature for undergraduates).

The book is divided into three main sections on products, rates, and transition states. Section one details the nature of products obtained from competing reactions (for example, the elimination and substitution reactions of alkyl halides) and examines topics such as regioselectivity and stereoselectivity. This is followed by discussion of the importance of kinetic and thermodynamic control on the ratios of products formed in competing reactions. Section two, on the various relationships between reaction rates and the structures of substrates, provides useful discussions of the hard and soft acids and bases principle and the influence of solvents on reaction rates.

The final section, constituting half the book, discusses how the nature of the transition state can affect both the rate and course of a reaction and covers topics such as linear free energy relationships (also discussed in the section on rates), kinetic isotope effects, energy surfaces, and the position of transition states on the reaction co-ordinate. There is an extensive discussion of pericyclic reactions using the conservation of orbital symmetry, the frontier molecular orbital, and aromatic transition state approaches. Again, surprisingly in view of the author's stated aim there is no treatment of periselectivity and regioselectivity in cycloaddition reactions, taking into account the importance of the coefficients of the frontier molecular orbitals, or of the in-

fluence of Lewis acid catalysts on cycloadditions. As in many books on aspects of physical organic chemistry, the discussion of homolytic reactions is also rather weak. The author frequently reinforces his points by discussing a particular reaction for example cycloadditions in more than one section of the book; and the cross-referencing between the various sections is good.

An extensive bibliography makes the book a useful source of much valuable information not found in many other texts, and a good index enhances the utility of the book. Although it is on the whole too advanced for undergraduates, it would be a useful acquisition for libraries.

D. C. Nonhebel

D. C. Nonhebel is lecturer in chemistry at the University of Strathclyde.

## Virtues of quantum mechanics

Molecular Quantum Mechanics (second edition)  
by P. W. Atkins

Oxford University Press, £29.50 and £13.95  
ISBN 0 19 855 171 1 and 170 3

Solutions Manual for "Molecular Quantum Mechanics"  
by P. W. Atkins  
Oxford University Press, £8.95  
ISBN 0 19 855180 0

As the second edition of a popular textbook that first appeared in 1970, this book aims to present "an outline of the quantum mechanical principles that are fundamental to an understanding of the properties of molecules". It is thus appropriate for certain undergraduate courses in chemistry and physics, and also perhaps in some branches of engineering.

This new edition has all the advantages of the first: it is beautifully produced, clearly and attractively written, and contains a wealth of worked examples and problems for classroom use. Although it is about the same length as was the first edition, there are substantial changes in organization, and some smaller changes in content, justifying the author's claim that the book is more a total rewriting than a second edition.

Anyone who has taught a course on molecular quantum mechanics to physical scientists will know that many, perhaps even the majority, of the class will hate the subject. They will profess a complete inability to understand anything, or to do any of the set problems. They will justify their distaste in terms of the course's "lack of relevance" or "X or Y who, after all, is the most distinguished scientist in the department" to do anything at all like this. They will also claim that the kind of science they are going to do when they leave, will not really depend on a knowledge of anything as arcane as molecular quantum mechanics.

The matters with which the book is concerned are conceptually tricky and basically highly mathematical. A successful book must somehow stimulate readers and persuade them that the algebra and analysis are worth tackling, because of the physical insights to which the formalism leads. Inevitably at this level, the author can tell the reader only half the truth, but this must be done without simultaneously telling half a lie. The author also has to bear in mind that, although most of his readers will not go on to do anything truly quantum mechanical, they must be able to feel that it is something they could do if they chose to try. He must also leave his readers with a reasonable impression of what can and what cannot be done using quantum mechanical methods.

Now these are obviously very tough requirements, and there can be different views about the correct balance of emphasis in meeting them. Failure to emphasize a point might be seen by some as incipient untruthfulness, while its emphasis might be regarded by others as un-

necessarily pedantic.

These problems may be illustrated fairly by considering the chapter on group theory, one that has changed quite considerably between the two editions. Although these changes have doubtless been made in the interests of greater accessibility for the material, they also mean that the distinction between the transformation properties of points and the transformation properties of functions, a distinction well and clearly made in the first edition, is practically lost here. For a student who goes on to use a book like Wigner or like Hamermesh (both of which are cited in the further reading section appended to this chapter), the distinction between these two kinds of transformation is one that is of the utmost importance. So, is the chapter really pointing the student in the right direction? On balance, perhaps it is not. On the other hand, a beginning student would probably find the chapter a very attractive introduction to the subject in context. And a student who went no further than this chapter would probably be left with the feeling that group theory was something that could be mastered. Has such a student had a confidence trick played on him? Well, yes and no.

This discussion typifies my feelings about the book as a whole. On the one hand, it is a fine book full of good things, attractively presented. On the other hand, when looked at more closely, not all the things are quite as easy as they are made to look. Is this a fault or a virtue? On balance, I would plump for it as a virtue. But one that, alas, I have never been able to acquire to inform my teaching, in the way that I imagine it informs Dr Atkins's.

Brian Sutcliffe

Brian Sutcliffe is reader in chemistry at the University of York.

## Natural pigments

The Biochemistry of Natural Pigments  
by G. Britton  
Cambridge University Press, £30.00  
ISBN 0 521 24892 2

Life would be very dull in the absence of colour, and yet this phenomenon only arises from the interaction between substances and light of a very restricted range of wavelengths. For the human eye this range is approximately 380-750 nanometres. However, the author of this book has not restricted himself to those natural pigments which are visible to man; he also includes some which are more significant for their absorption in the ultraviolet region. This decision is justified, not only on scientific grounds, in view of the fundamental relationship to other compounds which we see as coloured, but also in their importance as pigments which are visible to some organisms such as insects.

The natural pigments have aroused the curiosity of scientists for well over a century and a half, and throughout history natural dyes and pigments have been used by man. Although most of the early efforts were more concerned with the structure of these pigments rather than their biochemistry, it did become possible with an adequate corpus of knowledge on structure to speculate studies on their origin. From these early studies there also developed the technique of chromatography, initially for the separation of pigments, but now used extensively for the separation of all compounds whether they are coloured or not. (Historically the term chromatography goes even further back in time when George Fields used it to describe the mixing of artists' pigments in his book of 1835).

With the discovery and isolation in the 1930s of isotopes of elements present in natural compounds, it became possible to prepare labelled compounds which could then be followed as they were metabolized by plants or animals. In terms of pigments one of the largest groups of compounds is the carotenoids, and

the Liverpool school of biochemistry has played a major role in elucidating their biochemistry. Dr Britton, from Liverpool, has been actively involved in this work in recent years and is thus well placed to review the field.

After a brief survey of their structure and distribution in nature he considers the biosynthesis, function and applications of carotenoids (with a separate chapter on the role of vitamin A, which is derived from carotenoids, in vision). In general the function of carotenoids remains uncertain; and it is a philosophical point whether colour alone is a function - except possibly as so aid in the pollination of flowers, or as a warning, as camouflage, or for the recognition of other members of the species, especially of the other sex. Their role in photosynthesis and photoprotection in plants may also have parallels in the animal field.

Natural yellows and reds are usually derived from carotenoids except for those based on the flavonoid skeleton and related structures. This class is almost exclusively confined to plants and provides some of the most striking flower colours usually due to anthocyanidins. Although flavonoids are widely distributed in plants, their presence - often not obvious to the human eye - can only be noted when examined in the ultraviolet region. This reflects their role as insect guides in flowers to lead insect pollination, as the insect eye is able to detect absorption in the ultraviolet. Without recognizing the biochemical reason gardeners too have used these patterns to develop new varieties whereby flavones have been changed, following a mutation, to anthocyanidins to make such patterns visible.

Amount the red pigments, haemoglobin is perhaps the most significant. Essential to life for its role in oxygen transport, it is composed of the tetraphenyl prosthetic group haem, which is also the source of its colour.

Curiously the other major pigment essential to life is also a tetrapyrrole: the green pigment chlorophyll which plays such a central role in photosynthesis.

The remaining pigments considered by Dr Britton form a rather heterogeneous group, including the essentially colourless quinones involved in electron transport, quinones such as alizarin which are only strongly coloured when used in mordant dyeing, and the intense colours of the extended quinones of the aphid pigments. Among the polycyclic nitrogenous class of pigments, there are such miscellaneous examples as the betalains (for example, from beetroot) and the colourless natural source of the vat dye indigo. Also included are the polymeric melanins.

After chapters more concerned with functional aspects of pigments, Dr Britton concludes with a brief mention of those natural substances which bioluminesce, that is, produce light biochemically.

This book covers a wide range of topics encompassing many of the fundamental aspects of life. Designed for advanced undergraduate students or research workers in chemistry and biology, it should be of interest to a wider audience, including physiologists, horticulturalists, medical workers, food scientists, and so on. For those wanting a good, up-to-date review of any topic in this field, this book is to be recommended.

G. P. Moss

G. P. Moss is lecturer in chemistry at Queen Mary College, London.

A collection of articles on the Preparation, Properties, and Industrial Applications of Organofluorine Compounds has been edited by E. Banks and published by Ellis Horwood (Wiley) at £32.50. The book shows convincingly that social factors such as nationalism and the role of an individual within the community played an important part in theorizing about combustion, and even in the interpretation of experiments.

Unfortunately, he does not explain how one set of chemists could actually miss the evolution of oxygen from heated mercuric oxide whereas their rivals found no such difficulty. A social interpretation of science has much to commend it but it does have limits and one would dearly like to know how, in chemical terms, such a conflict could be sustained.

On a few other minor points one could express some disagreement. Can one, for example, associate oxygen chemistry with approval of the

## BOOKS

## CHEMISTRY

## Cherished phlogiston

The Formation of the German Chemical Community, 1720-1795  
by Karl Hufbauer  
University of California Press,  
£30.00 and £11.25  
ISBN 0 520 04318 9 and 04415 0

In the history of science, no amount of paraded erudition can substitute for an ability to write engagingly and to address as wide a public as possible. Also to be avoided is the glib prose of a careless "popularizer" unsupported by sound analysis or documentation. So it is a special pleasure to read this important book which avoids both jargon and sloppiness.

It manages to combine an immense wealth of documentary data with a narrative of the most exceptional interest. The theme is the emergence during the eighteenth century of a group of chemists scattered through the various German states. By 1795 they had gained sufficient social cohesion to justify the title of a "chemical community", thus marking an important stage in the social history of chemistry and the chemical history of Germany.

However, one must not exaggerate. The maximum number of "notorious" chemists identified as belonging to this community is 65. Of the eight men who constituted its inner core it is doubtful if more than three were ever together at one time. And although the word "profession" slips in from time to time, nothing approaching the modern meaning of that term appeared until many decades later. How then could they fairly be termed a "chemical community"?

Hufbauer's answer to this question is to demonstrate the gradual increase in support for chemistry in moral, material and manpower terms. When L. Croll's *Chemisches Journal* appeared in 1778 it catalysed a new degree of coalescence in this community which could, in large measure, be identified from the subscription list and the printed contributions. The author's use of this material, together with other related data, constitutes one of the great merits of his book. Who the individual subscribers were, what they wrote, and how they responded to one another become clear for the first time. Their potted biographies and the histories of their institutions, with prolific documentation, furnish appendices which occupy half of the book. Even without the narrative this impressive collection of data will serve scholars for many years to come.

To those who like their history on the grand scale, with full-length portraits of great scientists, such endless attention to lesser men may seem perverse. But it is only thus that we can penetrate the fine structure of a scientific community and begin to understand how its activities relate to events and pressures in the world outside.

The author's analysis of the relation between the science actually done and the life of "his" community focuses upon the passionate debates on the cherished doctrine of phlogiston, then being assailed by the new oxygen theory of Lavoisier. He shows convincingly that social factors such as nationalism and the role of an individual within the community played an important part in theorizing about combustion, and even in the interpretation of experiments.

Unfortunately, he does not explain how one set of chemists could actually miss the evolution of oxygen from heated mercuric oxide whereas their rivals found no such difficulty. A social interpretation of science has much to commend it but it does have limits and one would dearly like to know how, in chemical terms, such a conflict could be sustained.

On a few other minor points one could express some disagreement. Can one, for example, associate oxygen chemistry with approval of the



Lorenz Crell, founder of the first successful chemical journal. Taken from *The Formation of the German Chemical Community, 1720-1795* by Karl Hufbauer.

French Revolution, if not least one of its proponents took a distinctly low view of events in Paris, and its founder was a victim of the guillotine? The bibliographies, while invaluable, do not seem to draw upon the *Biographie Universelle* of Michoud. And table 19 seems to have lost its notes. However, these are minor blemishes in a work of great importance for present and future historians of science and an object lesson in effective communication.

Colin Russell

Colin Russell is professor of the history of science and technology at the Open University.

## Crystalline state

Crystallography  
by Ralph Steadman  
Van Nostrand Reinhold, £3.95  
ISBN 0 442 30498 6

Ralph Steadman's short monograph is another attempt to find an interesting and novel method for introducing students to what is probably the least exciting, yet surely the most fundamental, corner of crystallography. Although mathematical techniques are in the final analysis, the only really efficient way of codifying most crystallographic properties, and provide the most powerful tools for defining effects and discovering new relationships, it is the most fortunate of students that can accept and handle these techniques without reference to some pictorial representations.

Sequences of illustrations have been carefully organized to lend the attentive reader into a flexible and intuitive understanding of each topic. In effect, the author is trying to provide in 120 pages the practical experience, the comfortable familiarity with the topics, that might otherwise be obtained by many months of working in a research laboratory. He has succeeded in providing an almost "hands-on" approach to the initial stages of crystallography, without obliging the student to endure the tedious of performing measurements in experiments which he knows merely to be examples.

This pictorial approach works very well, at least in those sections dealing with structures, lattices, planes and directions. The informal presentation (unfortunately including unjustified text) has produced an easily readable book, very few parts of which require much careful reasoning or concentrated attention. The host

of questions are so easily answered that the reader is likely to be swept along into trying most of them, thus broadening his perspective on the topics. The reader who is prepared to deface illustrations might also like to add a few construction lines, which could serve to clarify or emphasize points.

Because this book is largely intended to teach by discovery, the text is kept to a minimum, and serves to initiate trains of thought. There are occasions when perhaps a little more explanation would be useful. For example, in the section on "directions in a lattice", the identification of the direction [110] is explained, and the direction [010] is illustrated; but no mention is made of the relationship between [010] and [020] until several pages later.

The opening section of the book, on "structures and lattices", works hard to help the student understand that a lattice is a concept, while the real thing is a structure. In section two, on "planes and directions", the page discussing directions in a hexagonal lattice, Weber indices (though marked "not important: it can be skipped"), could have been omitted altogether, or made more explicit. Although section three on "relations between planes and directions" is well enough done, the author explicitly writes out the cofactors of the matrix on one page, but assumes the reader can evaluate a determinant on another. Section four, on "atomic coordinates", expands the foundations laid in section one.

It is in section five, on "X-ray powder photographs", that the student will benefit from the stylized treatment of experimental results, although at some stage he should see a real photograph, and realize that in the laboratory all is not as clear as in the illustrations. Section six on "the reciprocal lattice", manages to convey some of the simplicity and elegance of the Ewald construction. The presentation is simple and uncomplicated, and the reader is likely to have grasped the principle before he realizes that many generations of students have found the concept of the reciprocal lattice complex and rather unnecessary. Section seven, on "electron diffraction", is perhaps the least satisfactory part of the book, probably because it can only begin to touch on a very large topic. Even so, it will provide a useful introduction to more detailed texts.

Though not a work of reference, this book is a useful and well-presented introduction to its subject.

D. J. Watkin

D. J. Watkin is lecturer in chemical crystallography at the University of Oxford.

## Basic skills

Fundamentals of Preparative Organic Chemistry  
by R. Kesse, R. K. Müller and T. P. Toule  
Ellis Horwood: Wiley,  
£15.00 and £6.50  
ISBN 0 85312 396 9 and 450 7  
Introduction to Organic Chemistry  
by Hugh J. Williams  
Wiley, £12.75 and £5.40  
ISBN 0 471 10206 7 and 10207 5

The contents of *Fundamentals of Preparative Organic Chemistry* came as a pleasant surprise, as this short book's English title does it less than full justice. I would have preferred *Basic Operations in Preparative Organic Chemistry*, as this would have been more faithful to the Swiss original (*Grundoperationen*) and much more informative. I would also have added a sub-title, *A Guide for Beginners in Research*.

The book offers practical advice to the student on all the important aspects of research work. There are chapters dealing with manipulative skills like distillation, crystallization, chromatography, extraction, the use of an inert atmosphere, and solvent purification. Other chapters deal with safety (including waste disposal and the handling of radioisotopes), and with literature searching, report-writing, and laboratory notebooks. The chapter on spectroscopy deals only with interpretation and not with experimental procedure.

Much wisdom and common sense is contained in these chapters, and the book should be on every research student's reading list. A good research supervisor, of course, ought to teach his students personally about all these matters, but those less fortunate in their choice of supervisor will find the book indispensable.

I wish I could be equally enthusiastic about *Introduction to Organic Chemistry*. If I were to offer a subtitle for this volume, it would have to be *Yet Another Introduction*, as there must have been at least two dozen similar books published during the past 20 years or so, and there is not much to choose among them. It follows, of course, that any newcomer in this highly competitive market must offer something novel (or at least different) in content or presentation if it is to displace established titles from recommended lists.

When I saw that this book had

African origins (Professor Williams works in Sierra Leone), I had high hopes that something novel was about to emerge, especially since the publisher emphasizes the particular relevance of some of the chapters for African students. However, these expectations were short-lived. Both content and approach are traditional; indeed, I found myself wondering more than once, if this was really an old manuscript in which odd bits and pieces had been added to keep it up to date. Certainly I could not find much in it that might not also have appeared in a similar book dated 1962, and I find it almost inconceivable that a textbook of the eighties should make no mention at all of spectroscopy (which, after all, has revolutionized the practice of organic chemistry during the past 25 years), and should pay so little attention to conformation (cyclohexane is not even discussed).

What the book does contain is more or less predictable. The first two parts deal with structural, physical, and theoretical matters, and the third part (which constitutes more than half of the total) is concerned with functional group reactions and the properties of simple aromatic systems. These parts are, in general, well presented, although there are occasional blunders of chemistry which could mislead an inexperienced student - for example, the conversion of a carboxylic acid into an acyl halide is described as a nucleophilic substitution of OH<sup>-</sup> by Cl<sup>-</sup>; and a spurious distinction is made between nucleophilic and electrophilic acyl substitution. The final part of the book contains a short account of stereochemistry, and two very strange chapters: "selected synthetic techniques", a rag-bag of odds and ends which ought to have been incorporated in part three; and "natural occurring products of Africa and their uses", which contains nothing more exotic than petrocyclics, carbohydrates, fats and oils, and some miscellaneous plant products. (It also contains the classic "howler" that α- and β-glucose are enantiomers.) I cannot recommend the book.

David Smith

David Smith is lecturer in chemistry at the University of St Andrews.

A second edition of D. R. F. West's *Ternary Equilibrium Diagrams* has been published by Chapman & Hall at £13.00 and £5.95. Problems have been provided, with outline solutions and answers, and a substantial new chapter extends the coverage of actual systems.

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Robin K Harris, Professor of Chemistry, University of East Anglia

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## Universities continued

## UNIVERSITY OF SOUTHAMPTON

## Department of Electronics

## Information Technology Microelectronics Mainstream Electronics

Applications are invited for five Lectureships in the above fields which are available from September/October 1983 as a result of additional funding from the University Grants Committee and the career progression of the existing staff of this large and active Department.

Candidates should have a good first degree in electronic engineering or a related discipline and relevant postgraduate

experience in a suitable topic—preferably to PhD level.

Salaries for these permanent posts will be within a scale rising to £13,505 (under review). Good relocation expenses.

Further particulars may be obtained from D.A.S. Copland, The University, Southampton SO9 5NH. Quote Ref: 2003/THES. Closing date for applications will be 31 May 1983.

## University of

## Cambridge

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Cambridge, 100 Brook Road, Cambridge CB2 3RQ. Tel: 0223 333000. Closing date for applications is 31 May 1983.

## University of

## Glasgow

## MANAGEMENT

## ACCOUNTANT

Applications are invited for a Lectureship in Management Accounting, to be held from September 1983. Further details are available from the Department of Management Accounting, University of Glasgow, Glasgow G1 7RQ. Tel: 0437 222222. Closing date for applications is 31 May 1983.

## University of

## Kent

## TEMPORARY

## LECTURESHIP IN

## POLITICS

Applications are invited for a Temporary Lectureship in Politics, to be held from September 1983. Further details are available from the Department of Politics, University of Kent, Canterbury, Kent. Tel: 0420 333000. Closing date for applications is 31 May 1983.

## University of

## Leeds

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Leeds, Leeds LS2 9JT. Tel: 0532 333000. Closing date for applications is 31 May 1983.

## University of

## Liverpool

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Liverpool, Liverpool L69 3GB. Tel: 051 333000. Closing date for applications is 31 May 1983.

## University of

## Manchester

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Manchester, Manchester M13 9PL. Tel: 061 333000. Closing date for applications is 31 May 1983.

## University of

## Newcastle

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Newcastle, Newcastle NE2 4BQ. Tel: 0209 333000. Closing date for applications is 31 May 1983.

## University of

## Nottingham

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Nottingham, Nottingham NG7 2RD. Tel: 0522 333000. Closing date for applications is 31 May 1983.

## University of

## Oxford

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Oxford, Oxford OX1 2JD. Tel: 01865 333000. Closing date for applications is 31 May 1983.

## University of

## Sheffield

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Sheffield, Sheffield S10 2TN. Tel: 0114 333000. Closing date for applications is 31 May 1983.

## University of

## Surrey

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Surrey, Surrey GU1 3AH. Tel: 0425 333000. Closing date for applications is 31 May 1983.

## University of

## Sussex

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Sussex, Sussex BN1 9QJ. Tel: 01323 333000. Closing date for applications is 31 May 1983.

## University of

## Trent

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Trent, Trent NG1 1PU. Tel: 01930 333000. Closing date for applications is 31 May 1983.

## University of

## Warwick

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Warwick, Warwick CV4 7AL. Tel: 0916 333000. Closing date for applications is 31 May 1983.

## University of

## Westminster

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Westminster, Westminster W6 2UW. Tel: 0181 333000. Closing date for applications is 31 May 1983.

## University of

## Wolverhampton

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of Wolverhampton, Wolverhampton WV1 1LY. Tel: 0902 333000. Closing date for applications is 31 May 1983.

## University of

## York

## LECTURESHIP IN

## PHYSICAL

## GEOGRAPHY

Applications are invited for a Lectureship in Physical Geography, to be held from September 1983. Further details are available from the Department of Geography, University of York, York YO1 5DD. Tel: 01904 333000. Closing date for applications is 31 May 1983.

UNIVERSITY  
COLLEGE OF  
SWANSEA'New Blood'  
Lectureships

Applications are invited for the following three vacancies of Lecturers. Applicants should preferably be not more than 35. The requirements for each post are shown in brackets.

Lecturer in Modern French History (Later eighteenth century to the early twentieth century).

Lecturer in Mathematics (The Use of Probability in Medicine).

The appointments, which will be made on a permanent basis, will be at the appropriate point within the Lectures scale £5,375-£13,505 per annum (under review).

Further particulars and application forms may be obtained from the University, University College, Swansea, Singleton Park, Swansea SA2 8PP. Closing date for applications is 31 May 1983.

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## University of Hong

## Kong

## SENIOR

## LECTURESHIP IN

## SURGERY

Applications are invited for a Senior Lectureship in Surgery, to be held from September 1983. Further details are available from the Department of Surgery, University of Hong Kong, Hong Kong. Tel: 0238 333000. Closing date for applications is 31 May 1983.

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## UGC INFORMATION

## TECHNOLOGY

## APPOINTMENTS

## (2 POSTS)

## (a) LECTURER IN

## COMPUTER

## SCIENCE

## (b) LECTURER IN

## SOFTWARE

## ENGINEERING

Applications are invited for two Lectureships in Computer Science and Software Engineering, to be held from September 1983. Further details are available from the Department of Computer Science, University of Kent, Canterbury, Kent. Tel: 0420 333000. Closing date for applications is 31 May 1983.

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## Polytechnics continued

## DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

## LECTURER GRADE II/ SENIOR LECTURER IN ELECTRICAL AND ELECTRONIC ENGINEERING

Applicants should preferably have some experience in the field of Linear Electronics, or Communications Engineering, or Computer Engineering.

## DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING

## PRINCIPAL LECTURER IN COMPUTER APPLICATIONS TO MANUFACTURING SYSTEMS

Applications are invited from highly qualified and experienced production, industrial or computer systems engineers who can contribute specialist expertise to teaching and research in one or more of the following disciplines: simulation of manufacturing systems, facility design, production scheduling, industrial engineering, computer-aided manufacturing or robotics.

## LECTURER GRADE II/ SENIOR LECTURER IN COMPUTER APPLICATIONS TO MANUFACTURING SYSTEMS

Applications are invited from good honours graduates in industrial or production engineering with at least three years relevant industrial experience. The post will involve teaching and research in one or more of the disciplines listed above. An interest in pursuing research is essential.

Salary Scales: Principal Lecturer £11,931-£15,018 Lecturer II/Senior Lecturer £8,955-£12,818

Further details and form of application from the Staff Officer, Trent Polytechnic, Burton Street, Nottingham. Closing date 13 May 1983.

**TRENT POLYTECHNIC**  
NOTTINGHAM

## Brighton Polytechnic

Department of Electrical and Electronic Engineering  
Information Technology Initiative

Senior Lecturers  
Lecturer Grade II/Senior Lecturers (4 POSTS)

Applications are invited from well qualified persons with recent industrial/teaching/research experience in one or more of the following areas: digital electronics; data communications; microprocessor applications; modern instrumentation technology. The posts arise from the retirement of staff and from a Government initiative intended to expand the provision for information technology.

Successful candidates will have the ability/potential to teach at honours degree level and above. A higher degree and/or interests in research/development activities is desirable but not essential.

The Department has currently over 300 students on honours degree courses and expects, within the near future, to offer a new honours degree, also a postgraduate course within the microelectronics/information technology area. Established and expanding research facilities are available which have a strong emphasis towards industrial collaboration.

Salary: Lecturer II £8,955-£11,022 Senior Lecturer £10,173-£12,818

Further details and application forms are obtainable from the Deputy Head of Personnel, Brighton Polytechnic, Moulsecomb, Brighton BN1 4AT. Tel: Brighton 893865, Ext. 2837. Closing date 17 May 1983.

SHEFFIELD CITY POLYTECHNIC  
HEAD OF DEPARTMENT OF HEALTH STUDIES

Applications are invited for the above post which will become vacant on 1st September, 1983. The Department is well established and offers a wide range of professional undergraduate and postgraduate courses in health care provision and health related studies together with significant and increasing interests in research.

Applicants must have appropriate qualifications, academic and professional experience and the necessary personal qualities to lead a large and active staff team in one of the leading departments of health studies.

The ability and desire to maintain close links with practitioners and the professional bodies is essential.

Salary: Barnham HOD Grade VI which is currently £15,867-£17,490. Application forms and further details are available from the Personnel Officer (Dept T856), Sheffield City Polytechnic, Hallford House, Fitzalan Square, Sheffield S1 2BB or by telephoning 0742-209111, Ext. 387. Completed forms should be returned by no later than 11th May, 1983.

Sheffield City Polytechnic is an Equal Opportunities Employer

## THE CITY POLYTECHNIC OF HONG KONG

The Hong Kong Government has appointed a Committee to plan the establishment of a Polytechnic in Hong Kong. To be named the City Polytechnic of Hong Kong, the institution will have an initial target of the equivalent of 8,000 full-time students by the early 1990's and a planned capacity for an ultimate population of 13,500. The Polytechnic expects to be able to enrol its first students in autumn 1984.

It is intended that the study programmes should be developed on a modular structure with a strong vocational flavour. The majority of courses will be at professional and higher technician levels, and a substantial number will be day-release and evening courses. There will also be degree programmes although the number of students on such programmes will not exceed 30% of the total student population.

The Planning Committee has appointed Prof. David J. Johns, Senior Pro-Vice-Chancellor of Loughborough University of Technology as the founding Director of the new Polytechnic and he will be taking up the appointment in October 1983. Meanwhile applications are invited for the following posts tentatively:

## AT ASSOCIATE DIRECTOR LEVEL

**Associate Director (Academic Planning)**  
To be responsible to the Director for detailed planning in the following areas: academic structure; course structure; academic validation and monitoring procedures; academic regulations; assessments and examinations; academic awards and student admissions. The appointee will also be expected to assume responsibility for the co-ordination of the preparation of academic development proposals and will be responsible for the implementation of the modular course structure.

**Associate Director (Resource Planning)**  
To be responsible to the Director for detailed planning in the following areas: staffing requirements at all levels; space and building requirements and allocations; equipment and other resource allocations. The appointee will be expected to identify resource requirements and to prepare the resource estimates to support the planned academic developments. In addition the appointee will be expected to assume responsibility for the implementation of the annual allocation of resources throughout the institution.

**Secretary to Council & Chief Administrative Officer**  
To be responsible to the Director for the co-ordination of all administrative functions and for the efficient discharge of secretarial functions to the Council and other committees of the Council as may be required.

## AT HEAD OF DEPARTMENT LEVEL

Heads of the following initial teaching departments:  
Accountancy Languages  
Business Studies Mathematical Studies  
Computing Studies Social Work

It is intended that a modular course structure will be adopted by the City Polytechnic and that departments will be grouped into Schools of Study. Heads of Departments would be expected to develop courses in their respective departments as part of the overall modular structure and also to function additionally as Chairmen of their School of Study from time-to-time.

**Academic Secretary**  
To be responsible for the development and operation of all functions relating to academic administration. The appointee will be expected to establish a proper framework of administrative arrangements in keeping with planned academic developments.

**Finance Officer**  
To be responsible for the development and operation of the Estates Office which will be responsible for all aspects of physical development and maintenance of all buildings, related plant and equipment coming within the purview of the Council.

**Finance Officer**  
To be responsible for all matters relating to the financial management function of the administration. The appointee will be expected to ensure that the financial management system is in keeping with planned academic developments.

**General Secretary**  
To be responsible for the development and operation of the personnel and general management functions of the Polytechnic administration and other secretarial functions relating to the governing Council. The appointee will be expected to ensure that the personnel management system is in keeping with planned academic developments.

**Librarian**  
To be responsible for the development and operation of a library that will be commensurate with the requirements dictated by planned academic developments with norms adopted by the Department of Education & Science in the U.K.

**Management Information Officer**  
To be responsible for the development and operation of a Management Information Unit. The function of the Unit will be to collect information from a variety of sources on all aspects of Polytechnic activity, to rationalise methods of data presentation, and, as an end-product to supply such data as may be required for planning purposes.

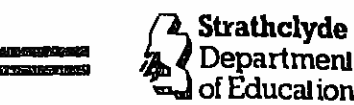
The Heads of Administrative Departments will be expected to work in conjunction with the Associate Director (Academic Planning) and the Associate Director (Resource Planning) to ensure that the administrative systems provide a proper framework for planned academic developments.

Salaries (currently under review):  
Associate Directors: HK\$27,450.00 per month (£30,857 p.a.)  
Heads of Departments: within a range but not less than HK\$22,200.00 per month (£24,955 p.a.)  
(Sterling equivalents as at 18th April, 1983)

**Terms and Conditions of Service**  
The initial appointment will be made on fixed-term contract of four years, at the end of which a gratuity equal to 25% of salary earned over the whole contract period will be payable. Benefits include long leave (approximately 3 months after every 12 months duty); heavily subsidized housing; medical and dental benefits and where appropriate children's education allowances and leave passages.

**Applications**  
Application forms and job specifications are obtainable from the Association of Commonwealth Universities (ACU), John Foulke House, 36 Bedford Square, London WC1H 9PF. Completed forms should reach the Secretary to the Planning Committee, P.O. Box 98441, Tsim Sha Tsui Post Office, Hong Kong, by Friday, 20th May, 1983. Two additional copies should also be lodged with the Association of Commonwealth Universities.

Interview of United Kingdom candidates on the preliminary shortlist will take place in London during the week beginning 13th June; candidates on the final shortlist will be interviewed in Hong Kong for interview during the week beginning 11th July, 1983.



## GLASGOW COLLEGE of TECHNOLOGY

## LECTURER 'A' IN CHEMISTRY

The person appointed will be a specialist in inorganic or Physical Chemistry and will be required to teach this branch of Chemistry. Applicants should possess an honours degree in Chemistry or an equivalent qualification. Relevant industrial experience and a research interest, particularly in an aspect of materials analysis or corrosion science would be added recommendations.

## LECTURER 'A' IN PSYCHOLOGY

The Department wishes to appoint a well qualified and experienced Lecturer to teach on undergraduate honours degree courses and professional courses. The person appointed would be required to contribute to at least 2 of the following areas:  
DEVELOPMENTAL PSYCHOLOGY, SOCIAL PSYCHOLOGY, INDUSTRIAL/OCCUPATIONAL PSYCHOLOGY and PSYCHOLOGY FOR PROFESSIONAL NURSES.

Salary Scale (both posts) - £7,956-£11,700 - (bar) £12,861.  
Application forms from the Personnel Office, Glasgow College of Technology, Cowcaddens Road, Glasgow G4 0BA. Tel: 041-822 7070, to whom applications should be returned within 14 days of the appearance of this advertisement.



ROBERT GORDON'S INSTITUTE OF TECHNOLOGY, ABERDEEN  
SCHOOL OF LIBRARIANSHIP

## LECTURER

Applications are invited from fully-qualified Librarians of Graduate status for the above position. The successful applicant will join the Bibliographic and Reference Studies team, and expertise in Information Technology will be an additional advantage.

Salary range £7,956-£12,581 per annum (under review).

Assistance with removal expenses.

Details from Secretary, Robert Gordon's Institute of Technology, Schoolhill, Aberdeen AB9 1FR. (0224 833811).

KINGSTON POLYTECHNIC  
School of Teacher Education & Music

Applications are invited for the following appointments in Teacher Training, from September 1983:

## SENIOR LECTURER/LECTURER II IN MATHEMATICS (Primary)

This is a full-time permanent appointment for which recent primary school teaching experience and a good qualification in mathematics will be important. An ability to contribute to one or more other aspects of Teacher Training would be useful.

## LECTURER II IN PRIMARY SCHOOL STUDIES

This is a temporary appointment for one year, which might suit a teacher on secondment from school. Particular requirements include an ability to lecture on the school curriculum. Recent primary school teaching experience is important, so is the ability to contribute to the teaching of one or more subjects in the curriculum.

Salary scales: Lecturer II £7,404-£11,571 Senior Lecturer £10,722-£13,355 (Both include London allowance)

Application forms and further details from Academic Registry, Dept AO, Kingston Polytechnic, Penryn Road, Roade, Northampton NN4 2EE. Tel: 01-649 1366. Closing date 13 May 1983.

DUNDEE COLLEGE OF TECHNOLOGY  
(Re-advertisement)

Applications are invited for the post of

## COLLEGE SECRETARY

The college - a Scottish Central Institution - offers a wide range of degree and diploma courses. The person appointed will be directly responsible to the Principal for the administrative, financial and legal affairs of the college and he/she will also act as Secretary to the Board of Governors and the Academic Council.

Applicants should have appropriate graduate and/or professional qualifications together with substantial administrative experience of a responsible level, preferably in higher education.

The salary is presently £17,847 (which reflects an upgrading since the previous advertisement) and a cost of living award, with retrospective effect from 1st April 1983, is currently under negotiation. Financial assistance towards the cost of removal expenses may be payable.

Further particulars and application forms are available from the Principal, Dundee College of Technology, Bell Street, Dundee DD1 1BB, to whom completed applications should be returned by 16 May 1983.

## Polytechnics continued

HUMBERSIDE POLYTECHNIC  
Department of Computer Studies & Mathematics  
PRINCIPAL LECTURER IN COMPUTER STUDIES

The Polytechnic has a reputation for its high quality teaching and research in computer studies and mathematics. The Principal Lecturer in Computer Studies will be responsible for the development and delivery of courses in computer studies and mathematics. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in computer studies or mathematics, or an equivalent qualification. Experience in teaching and research in computer studies and mathematics is essential. A research interest in computer studies or mathematics would be an advantage.

Salary: £11,931-£15,018 (Principal Lecturer).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, The Polytechnic, Outcros, Huddersfield HD1 3DH. Tel: (0484) 22288 ext. 224.

## PLYMOUTH POLYTECHNIC

PLYMOUTH BUSINESS SCHOOL  
Lecturer II

In Marketing (1 YEAR POST)  
SALARY: £8,955-£11,022 (PAY AWARD PENDING)

Applications are invited for the above post for a Lecturer II in Marketing. The successful candidate will be expected to teach on a variety of courses in Marketing and Business Policy across the Polytechnic. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in Marketing or Business, or an equivalent qualification. Experience in teaching and research in Marketing or Business is essential. A research interest in Marketing or Business would be an advantage.

Salary: £8,955-£11,022 (Lecturer II).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Plymouth Polytechnic, Drake Circus, Plymouth PL4 8AA.

Brighton Polytechnic  
Department of Business Studies

## 1. LECTURER II/ SENIOR LECTURER IN MARKETING RESEARCH/ MARKETING

The department seeks to appoint a Lecturer II or Senior Lecturer in Marketing Research/Marketing. The successful candidate will be expected to teach on a variety of courses in Marketing Research/Marketing across the Polytechnic. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in Marketing Research/Marketing, or an equivalent qualification. Experience in teaching and research in Marketing Research/Marketing is essential. A research interest in Marketing Research/Marketing would be an advantage.

Salary: £8,955-£11,022 (Lecturer II).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Brighton Polytechnic, Moulsecomb, Brighton BN1 4AT.

## 2. LECTURER II/ SENIOR LECTURER IN INFORMATION TECHNOLOGY

The department seeks to appoint a Lecturer II or Senior Lecturer in Information Technology. The successful candidate will be expected to teach on a variety of courses in Information Technology across the Polytechnic. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in Information Technology, or an equivalent qualification. Experience in teaching and research in Information Technology is essential. A research interest in Information Technology would be an advantage.

Salary: £8,955-£11,022 (Lecturer II).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Brighton Polytechnic, Moulsecomb, Brighton BN1 4AT.

Thames Polytechnic  
School of Chemistry

## PRINCIPAL/SENIOR LECTURER IN ORGANIC CHEMISTRY

The successful applicant will take a leading role in the development of the department and will be expected to contribute to the provision of a high standard of teaching and research in Organic Chemistry.

Applicants should have an honours degree in Organic Chemistry, or an equivalent qualification. Experience in teaching and research in Organic Chemistry is essential. A research interest in Organic Chemistry would be an advantage.

Salary: £11,931-£15,018 (Principal Lecturer).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Thames Polytechnic, Watlington Road, Uxbridge, Middlesex UB8 3PH.

Brighton Polytechnic  
Department of Business Studies

## 1. LECTURER II/ SENIOR LECTURER IN MARKETING RESEARCH/ MARKETING

The department seeks to appoint a Lecturer II or Senior Lecturer in Marketing Research/Marketing. The successful candidate will be expected to teach on a variety of courses in Marketing Research/Marketing across the Polytechnic. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in Marketing Research/Marketing, or an equivalent qualification. Experience in teaching and research in Marketing Research/Marketing is essential. A research interest in Marketing Research/Marketing would be an advantage.

Salary: £8,955-£11,022 (Lecturer II).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Brighton Polytechnic, Moulsecomb, Brighton BN1 4AT.

## 2. LECTURER II/ SENIOR LECTURER IN INFORMATION TECHNOLOGY

The department seeks to appoint a Lecturer II or Senior Lecturer in Information Technology. The successful candidate will be expected to teach on a variety of courses in Information Technology across the Polytechnic. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in Information Technology, or an equivalent qualification. Experience in teaching and research in Information Technology is essential. A research interest in Information Technology would be an advantage.

Salary: £8,955-£11,022 (Lecturer II).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Brighton Polytechnic, Moulsecomb, Brighton BN1 4AT.

Polytechnic of Central London  
School of Engineering & TechnologyDivision of Mathematics & Computing  
LECTURER II IN APPLIED MATHEMATICS AND/OR OPERATIONAL RESEARCH

Applications are invited for the above post for a Lecturer II in Applied Mathematics and/or Operational Research. The successful candidate will be expected to teach on a variety of courses in Applied Mathematics and/or Operational Research across the Polytechnic. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in Applied Mathematics and/or Operational Research, or an equivalent qualification. Experience in teaching and research in Applied Mathematics and/or Operational Research is essential. A research interest in Applied Mathematics and/or Operational Research would be an advantage.

Salary: £8,955-£11,022 (Lecturer II).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Polytechnic of Central London, Uxbridge, Middlesex UB8 3PH.

Surrey Education Committee  
North East College of Technology  
Reading Road, Ewell, Surrey, KT17 3DS

## HEAD OF DEPARTMENT OF BUSINESS AND MANAGEMENT STUDIES (Grade IV)

Applications are invited from well qualified candidates who have had good teaching and managerial experience.

The College is situated in a major business centre on the Thames Valley where considerable expansion is expected to take place over the next few years.

Salary Scale: £13,491-£15,117.

Application forms and further particulars may be obtained from the Principal, Reading College of Technology, Reading Road, Reading RG1 4HL. Tel: Reading 583501. Closing date: Two weeks from the appearance of this advertisement.

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Sunderland Polytechnic  
Department of Mathematics and Computing Studies  
PRINCIPAL LECTURER IN COMPUTER STUDIES

The Polytechnic has a reputation for its high quality teaching and research in computer studies and mathematics. The Principal Lecturer in Computer Studies will be responsible for the development and delivery of courses in computer studies and mathematics. The appointee will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in computer studies or mathematics, or an equivalent qualification. Experience in teaching and research in computer studies and mathematics is essential. A research interest in computer studies or mathematics would be an advantage.

Salary: £11,931-£15,018 (Principal Lecturer).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Sunderland Polytechnic, Sunderland, Tyne and Wear.

Polytechnic of the South Bank  
Borough Road, London, SE1 0AA

## PRINCIPAL LECTURER/ SENIOR LECTURER/ GRADE II IN STATISTICS WITH O.R.

Applications are invited from persons working in the field of statistics or operations research. The successful candidate will be expected to contribute to the development of the department and to the provision of a high standard of teaching and research.

Applicants should have an honours degree in statistics or operations research, or an equivalent qualification. Experience in teaching and research in statistics or operations research is essential. A research interest in statistics or operations research would be an advantage.

Salary: £11,931-£15,018 (Principal Lecturer).  
Application forms (to be returned by 13th May 1983) and further details are available from the Personnel Office, Polytechnic of the South Bank, Borough Road, London SE1 0AA.

Further particulars of the post and of the Polytechnic may be obtained from the Staff Officer, Polytechnic of the South Bank, Borough Road, London SE1 0AA. Tel: 01-592 8888.

Closing date for receipt of applications will be Friday 13th May 1983.

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Nene College Northampton

**SENIOR LECTURER****PRIMARY PROFESSIONAL STUDIES LEADER**

Applications are invited from suitably qualified people for the above post, commencing 1st September, 1983.

The successful applicant will be responsible for the development of Primary Professional and Curriculum Studies in the College including leading a new primary curriculum unit in the B.Ed. degree.

**LECTURER II/SENIOR LECTURER****IN READING AND LANGUAGE DEVELOPMENT**

Applications are invited from suitably qualified people for the above post, commencing 1st September, 1983.

The successful applicant will be expected to offer specialist contribution in this key curriculum area, reading and co-ordinating work in a unit of the B.Ed. degree and in appropriate in-service courses.

For further details and application form for the above posts, send a.s.e. to the Dean, School of Education and Social Science, Nene College, Moulton Park, Northampton NN2 7AD.

Completed application forms should be returned by 11th May, 1983.

**THE BRITISH SCHOOL OF OSTEOPATHY  
COURSE CO-ORDINATOR**

A vacancy exists for a Course Co-ordinator for the 4-year full time Diploma Course. The appointment would preferably be full time, on a 3-4 year engagement initially, and presents an opportunity for a person with experience of running degree-level courses. A science or health-care background would be desirable, but not essential.

The post would be particularly suitable for someone who has taken early retirement. Salary (full time) in the Senior/Principal Lecturer range. The School is a private establishment with charitable status. Please apply with an outline of your experience, to the Principal, from whom further details may be obtained.

Sir Norman Lhop, The Principal, The British School of Osteopathy, 1/4 Suffolk Street, London, SW1Y 4HQ. Tel: 01-930 9254.

**Cambridgehire College of Arts and Technology  
TEMPORARY LECTURER I IN ENGLISH**

Required for one year from September 1983. Details should be sent to the Principal, Cambridgehire College of Arts and Technology, 1/4 Suffolk Street, London, SW1Y 4HQ. Tel: 01-930 9254.

Salary scale £5,355-£9,267 (under review) depending on qualifications and experience.

Details and application form to be returned by 11th May 1983 to the Principal, Cambridgehire College of Arts and Technology, 1/4 Suffolk Street, London, SW1Y 4HQ. Tel: 01-930 9254.

**Chester College of Higher Education**

The following Lecturers are required from 1st September 1983 in courses leading mainly to B.A. and B.Sc. degrees of the University of Liverpool.

**LECTURER IN HISTORY**

To help with a course in the Department of History, evidence and able to offer British and European history within the period 1900-1960.

**LECTURER II IN PSYCHOLOGY**

To help with courses in General Psychology and Applied Psychology. Particular interest in developmental and social psychology required.

**LECTURER II IN RELIGIOUS STUDIES**

Applicants should be able to make a significant contribution to subjects of Theology, Religion and Church History.

Salary scale on appropriate scale of £5,355-£9,267. Further details from the Principal, Chester College of Higher Education, Chester Road, Chester, CH1 4BQ. Tel: 01-930 9254. Applications to be returned by 11th May, 1983.

**Luton College of Higher Education  
Department of Business Studies and Public Administration  
LECTURER I - INFORMATION TECHNOLOGY IN BUSINESS STUDIES**

Applications are invited for this new appointment to strengthen the team responsible for developing a suitable IT, Information, and Management in the Department. The successful candidate must be a wide range of advanced courses.

Preference will be given to candidates having suitable qualifications and/or experience.

Salary - £5,355-£9,267 (under review).

Details and Application Form to be returned by 11th May 1983 to the Principal, Luton College of Higher Education, 1/4 Suffolk Street, Luton, LU1 3JF. Tel: 01-930 9254.

**Colleges of Art****Inner London Education Authority Central School of Art and Design**

Southampton Row, London WC2E 7AF. Tel: 01-930 9254.

**HEAD OF GRAPHIC DESIGN DEPARTMENT (Burnham Grade IV)**

The Department provides a three year course for full-time students, leading to a BA (Hons) Graphic Design and a four year MA course, plus part-time related courses.

Salary £13,941 - £15,117 plus 10% Inner London Allowance.

Applicants should be able to make a significant contribution to the Department. Details and application form to be returned by 11th May 1983 to the Principal, Inner London Education Authority, Central School of Art and Design, Southampton Row, London WC2E 7AF. Tel: 01-930 9254.

**BEDFORD COLLEGE OF HIGHER EDUCATION****Lecturer II in Computer Science**

Do you have experience in:  
Operating Systems?  
Micro-Computers?  
Basic, Pascal, Fortran?  
Assembly?

An opportunity has arisen for an additional appointment to a team teaching a wide range of initial and advanced courses to meet the needs of young and adult students, and of local industry and commerce.

Applicants should have substantial applied computing experience and a degree or equivalent qualifications. Further details from The Director, Bedford College of Higher Education, Cauldwell Street, Bedford MK42 9AR. Tel: 0234 45151.

**Adult Education****North Yorkshire County Council****Ashham Bryan College of Agriculture and Horticulture**

Ashham Bryan, York, YO2 3PH.

**LECTURERS/SENIOR LECTURERS**

Applications are invited for the following appointments:

1. Horticulture Lecturer, to teach in the Horticulture Department, Ashham Bryan College, York, YO2 3PH.

2. Horticulture Lecturer, to teach in the Horticulture Department, Ashham Bryan College, York, YO2 3PH.

3. Horticulture Lecturer, to teach in the Horticulture Department, Ashham Bryan College, York, YO2 3PH.

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19. Horticulture Lecturer, to teach in the Horticulture Department, Ashham Bryan College, York, YO2 3PH.

20. Horticulture Lecturer, to teach in the Horticulture Department, Ashham Bryan College, York, YO2 3PH.

**Research & Studentships****LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE****SSRC Research-linked Studentships**

Applications are invited from students holding at least Upper Second Class Honours degree for studentships linked to staff research in the following areas:

Economics

(1) Monetary and Budgetary Policy

(2) Labour Market Analysis

(3) Information and Incentive problems, and Industrial structure

(4) Microeconomic analysis of macroeconomic problems

(5) Interaction between the labour market and the macroeconomy

(6) British energy history

(7) History of pension funds

(8) Comparative Business history

(9) Language development and young children

(10) Deprived youth, work and leisure

(11) Social policy with special reference to poverty and disability

(12) Kinship systems and their transformation

(13) Social structure to developing societies

Studentships are available for two years, with the possibility of extension for a third year. Successful candidates will be registered for the University of London MPhil/PhD. Candidates may also be considered for nomination for other SSRC awards. Enquiries (specifying research area) should be addressed to:

Secretary of the Graduate School, London School of Economics and Political Science, Houghton Street, London WC2A 2AE

**BIRKBECK COLLEGE (University of London)****SOCIAL SCIENCE STUDENTSHIPS AT BIRKBECK**

The Social Science Research Council has allocated the following studentships for research and advanced courses to the Birkbeck College, University of London.

1. **Linked Research Studentships**  
Despatched theory and validation. Professor R. Potts, Economics. Economics of military expenditure. Dr R. P. Smith, Economics. Representation in object perception. Dr G. W. Humphreys, Psychology. Long-term changes in nutrition, welfare and productivity in Britain. Professor R. C. Potts, Economics and Social History. Social economic and demographic changes in the South East Region using the population census. Professor D. W. Marsh, Geography.

2. **Advanced Course Studentships**  
These awards are available for the M.Sc. Economics course. For further information and application forms for admission to the College apply immediately to the Registrar, Birkbeck College, Market Street, London, WC1E 2BU.

**THIRD WORLD FOUNDATION**

wishes to appoint

**EDITORIAL RESEARCH ASSISTANT**

to carry out assessment and evaluation of information and manuscripts on Third World issues with particular reference to South Asian region. Research and analysis of political and social developments in Pakistan. Specialist knowledge particularly of contemporary political affairs of Pakistan is a necessary prerequisite. Excellent ability to evaluate information and to communicate both in writing and orally is essential. Fluency in Urdu and Punjabi and regional languages of Pakistan also required. Outstanding academic qualifications and research background required for the job. PhD or equivalent in Social Sciences from a reputable institution in Britain will be preferred.

Age: 28/35

Salary attractive.

Please write in the first instance with full C.V. to: Company Secretary, Third World Foundation for Social & Economic Studies, New Zealand House, 80, Haymarket, London SW1Y 4TS

**University of Bristol****S.S.R.C. LINKED STUDENTSHIP**

Applications are invited for a research studentship in the area of Social and Economic Studies, funded by the S.S.R.C. The successful candidate will be required to undertake research in the area of Social and Economic Studies, funded by the S.S.R.C. The successful candidate will be required to undertake research in the area of Social and Economic Studies, funded by the S.S.R.C.

Details and application form to be returned by 11th May 1983 to the Principal, University of Bristol, 1/4 Suffolk Street, Bristol, BS1 1JF. Tel: 01-930 9254.

**University of London****POSTGRADUATE RESEARCH IN GEOGRAPHY AT THE SCHOOL OF ORIENTAL AND AFRICAN STUDIES**

Applications are invited from students holding at least Upper Second Class Honours degree for studentships linked to staff research in the following areas:

(1) Monetary and Budgetary Policy

(2) Labour Market Analysis

(3) Information and Incentive problems, and Industrial structure

(4) Microeconomic analysis of macroeconomic problems

(5) Interaction between the labour market and the macroeconomy

(6) British energy history

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(10) Deprived youth, work and leisure

(11) Social policy with special reference to poverty and disability

(12) Kinship systems and their transformation

(13) Social structure to developing societies

Studentships are available for two years, with the possibility of extension for a third year. Successful candidates will be registered for the University of London MPhil/PhD. Candidates may also be considered for nomination for other SSRC awards. Enquiries (specifying research area) should be addressed to:

Secretary of the Graduate School, London School of Economics and Political Science, Houghton Street, London WC2A 2AE

**University of Oxford****RESEARCH OFFICER**

Applications are invited for a research officer in the area of Social and Economic Studies, funded by the S.S.R.C. The successful candidate will be required to undertake research in the area of Social and Economic Studies, funded by the S.S.R.C.

Details and application form to be returned by 11th May 1983 to the Principal, University of Oxford, 1/4 Suffolk Street, Oxford, OX1 1JF. Tel: 01-930 9254.

**Field Studies Council****DIRECTOR**

The Field Studies Council is a charitable organization which is concerned with the study of the natural world. The Council is currently seeking a Director to lead the organization and to develop its research and educational activities. The successful candidate will be required to undertake research in the area of Social and Economic Studies, funded by the S.S.R.C.

Details and application form to be returned by 11th May 1983 to the Principal, Field Studies Council, 1/4 Suffolk Street, London, SW1Y 4HQ. Tel: 01-930 9254.

**University of London****POSTGRADUATE RESEARCH IN GEOGRAPHY AT THE SCHOOL OF ORIENTAL AND AFRICAN STUDIES**

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**Administration continued****Department of Education and Science****HM Inspector of Schools****Further and Higher Education****Agriculture and Horticulture****Catering and Food**

Applications are invited from men and women, preferably aged between 35 and 45, for appointment as HM Inspectors. HMI provides a service of professional advice to the Department of Education and Science and normally carry out a general as well as a specialist assignment. This work primarily involves inspecting and advising educational institutions, but also includes consulting with local education authorities and contributing to in-service training.

Vacancies exist for inspectors specialising in: Agriculture and Horticulture and Catering and Food.

Applicants must have had considerable experience and responsibility in their specialist area and have an active interest in its applications. Appropriate academic qualifications, teaching and industrial/professional experience are essential. Starting salary is within the range £13,840-£19,930 (up to £1,220 higher in London). Promotion prospects.

Application forms (to be returned by 31 May 1983) and further information may be obtained from Mr E. O. Foster, Department of Education and Science, Room 18/17 Elizabeth House, 39 York Road, London SE1 7PH, telephone 01-928 8222, extensions 2786 or 2237. Please quote 4/83.

Further particulars from the Departmental Assistant, Department of Education and Science, Room 18/17 Elizabeth House, 39 York Road, London SE1 7PH, telephone 01-928 8222, extensions 2786 or 2237. Please quote 4/83.

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**Jean Bococ**  
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